LAPAROSCOPIC INGUINAL HERNIA REPAIR-TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH

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Dedicated

to

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Teachers

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ABBREVIATIONS

LIHS	Laparoscopic Inguinal Hernia Surgery
TAPP	Trans Abdominal Pre Peritoneal
TEP	Totally Extra Peritoneal
Op	Operative
U/L	Unilateral
B/L	Bilateral
EHS	European Hernia Society
H/O	History Of
SD	Standard Deviation

ABSTRACT

Introduction- Totally extraperitoneal (TEP) repair and Transabdominal preperitoneal (TAPP) repair are the two standardized laparoscopic techniques for inguinal hernia repair. Although several studies were conducted in the past, there was still no certain answers regarding the best laparoscopic approach for inguinal hernia repair.

Aim: To compare the outcomes of the Trans abdominal pre peritoneal repair (TAPP) versus Totally Extra peritoneal repair (TEP) for Inguinal hernia.

Material & Methods: This prospective study was conducted at Dayanand Medical College and Hospital, Ludhiana from 1st January, 2018 to 31st March, 2019 and included 54 patients admitted with unilateral or bilateral uncomplicated inguinal hernia. Patients undergoing laparoscopic TEP or TAPP inguinal hernia repair were compared on various intra operative and post operative parameters.

Results: 54 patients were included in the study (TEP, 27; TAPP, 27). Both groups were comparable in terms of demographic profile and hernia characteristics. TEP had significantly less mean operative time as compared to TAPP. Pain scores and injectable analgesics requirement were significantly higher in TAPP as compared to TEP. Post-operative stay was significantly higher in TAPP then TEP. Surgical outcome in terms of intra operative and post operative complications, hernia recurrence and chronic pain for the two endoscopic techniques is comparable

Conclusion: The lesser intraoperative duration of surgery with less post operative pain scores and less post operative hospital stay, favour the use of TEP over TAPP for repair of inguinal hernia.

Keywords: Inguinal hernia, laparoscopy, TEP, TAPP, unilateral , bilateral

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INTRODUCTION

Hernia is an abnormal protrusion of an organ or tissue through a defect in surrounding wall. Although a hernia can occur at various sites in the body, these defects most commonly involve the abdominal wall, particularly the inguinal region. About 75% of all hernias occur in the inguinal region. Two-third of these are indirect and one third direct hernias. Men are more likely to have inguinal hernia as compared to women. More than 600000 hernia surgeries are done in United states annually, making hernia repair to be the most common surgery performed by general surgeons.[1]

Abdominal wall hernias occur at sites where the fascia is not covered by the muscle layer. Hernia is said to be reducible, if its contents can be replaced back into the surrounding musculature. Hernia is said to be obstructed or irreducible if its contents cannot be reduced back. Inguinal hernias are classified as direct and indirect. The sac of indirect inguinal hernia passes from the internal inguinal ring towards the external ring into the scrotum. The sac of direct hernia passes forwards through posterior wall of inguinal canal, medial to inferior epigastric vessels. The prevalence of hernia increases with age and also the risk of complications like obstruction and strangulation.

A bulge in the inguinal region is the main diagnostic finding in most cases. Patient can have pain or vague discomfort in the groin region but one third of patients will have no symptoms. The inguinal region is examined in both supine and standing positions. Inspection and palpation is done to look for asymmetry, bulges or any mass. Asking the patient to cough can facilitate the diagnosis of hernia. Ultrasound can be used in the diagnosis of occult or incipient hernias.

Inguinal hernia repair is one of the most commonly performed surgery, and this bring about a significant cost and morbidity burden worldwide. The surgical technique for inguinal hernia has continued to evolve.

Various surgical repairs include –

-Tissue repairs like Ilio-pubic repair, Shouldice repair, Bassini and Mcvay repairs.[1] These have high reoccurrence rates. In conditions where mesh placement is contraindicated, tissue repair is necessary.

-Liechtenstein's tension free mesh repair is the most popular among surgeons due to its short learning curve and low recurrence rates and has firmly established itself as the gold standard for Inguinal hernia.[2] Here a piece of prosthetic, non absorbable mesh is fashioned to fit the canal.

With the advent of Minimally invasive procedures in the late 20th century, it has made forays in the inguinal hernia surgery. The two main techniques of laparoscopic inguinal hernia surgery (LIHS) are the Totally Extraperitoneal repair (TEP) and the Transabdominal Preperitoneal repair (TAPP). They are tension free mesh repairs by a pre-peritoneal approach. The laparoscopic approach provides the advantage of placing a large mesh behind the defect, covering the myo-pectineal orifice.

The LIHS was started in the 1990s and is being rapidly practiced worldwide. The advantages of the minimal access surgery include less pain in the early post-operative period, less need for analgesics, quicker recovery, better visualization of the anatomy, better cosmesis, early return to normal activity and decreased wound-related problems with usefulness in fixing all hernia defects.[3]

Today, LIHS is recommended procedure for bilateral/recurrent Inguinal hernia.[4]

Widely accepted indications for endoscopic inguinal hernia repair are hernia recurrence, particularly following an initially performed open repair, and bilateral hernias.

Increasing need for excellent results along with patient satisfaction, have prompted the need to find out the best technique of laparoscopic inguinal hernia repair. There are two standardized techniques of laparoscopic inguinal hernia repair, Transabdominal Preperitoneal repair (TAPP), described by Arregui [5] in 1992, and Total Extraperitoneal repair (TEP),

described by McKernan and Laws [6] in 1993. The main difference between the two repairs is the sequence of gaining access to the pre-peritoneal space. In the TEP approach, the dissection begins in the preperitoneal space using a balloon dissector. With the TAPP, the preperitoneal space is accessed after initially entering the peritoneal cavity. Each approach has its merits and demerits.

TAPP is relatively easy to learn but has the disadvantage in that the peritoneal cavity is breached and there is a possibility of bowel adhesions to the mesh.[7,8]

TEP is technically difficult procedure to learn. The working space is more limited and the surgeon needs to be familiar with an unfamiliar anatomy. The advantage is of quicker access of pre-peritoneal space and direct approach to posterior defects and non-violation of peritoneal cavity.[9]

Dissection in the preperitoneal space using the TEP technique is often depicted as being more complex, as anatomic landmarks are difficult to identify compared to the TAPP technique.

The best hernia repair procedure should be simple, rapid, and safe. It should result in less surgical trauma, postoperative pain, and low recurrence rate.

Advantages of using a laparoscopic approach over open repair is the ability to address all defects of the myo-pectineal orifice with the ability to deal with bilateral hernias through the same incisions, decreased rates of recurrences.[10-12] These outweigh the disadvantages that include increased cost and operative time and the more learning curve.[13,14]

TEP and TAPP are the two standard techniques of inguinal hernia repair. There is a scarcity of data comparing the two techniques, to decide on the best laparoscopic technique of inguinal hernia repair. Many clinical trials were conducted to compare TAPP and TEP, whereas conflicting clinical outcomes from short-term and long term follow-up were reported.[15]

2 decades earlier, the first study was published comparing the two minimally invasive surgical techniques— transabdominal preperitoneal

patch plasty (TAPP) versus total extraperitoneal patch plasty (TEP)—for surgical repair of inguinal hernia.[16] Since then various systematic reviews, meta-analysis, RCTs, case control and observational studies have been conducted , comparing TEP and TAPP. Some studies reported that TAPP was associated with higher pain scores, longer operation time, longer hospital stay and more incidence of cord edema than TEP, whereas some others stated that there was no significant difference. Although guideline for laparoscopic hernia repair was formulated by the International Endohernia Society [17] there was still no certain answer to show if TAPP is better or worse than TEP.

The present study is formulated to evaluate TAPP and TEP in regards of various intra operative data including duration of surgery, any intra operative injury or conversion to other surgical repair technique and in regard to post-operative data like post operative pain, need of injectable analgesics, wound infection, seroma formation, duration of post operative hospital stay, time for return of bowel function, or long term complications like hernia recurrence or any chronic pain.

Long term complications like hernia recurrence depend on various factors. The main causes of hernia recurrence are mesh rupture, mesh slippage and mesh shrinkage. These factors could partly be prevented by an appropriate mesh overlap and fixation technique. But the applied fixation system is an important cause of the chronic post operative pain.

AIMS AND OBJECTIVES

To compare the outcomes of the Trans abdominal pre peritoneal repair (TAPP) versus Total ly Extra peritoneal repair (TEP) for Inguinal hernia.

REVIEW OF LITERATURE

A hernia is defined as a protrusion, bulge or a projection of an organ or a part of an organ through the body wall that normally contains it. In an inguinal hernia the protrusion occurs through the inguinal canal. Groin hernias is the most common condition for which primary care physicians refers patients for surgical management. Approximately 96% of groin hernias are inguinal and 4% are femoral.[18]

It is more common on the right than on the left side, the ratio being 2:1, possibly because of the later descent of the right testicle and the associated patent processus vaginalis.

Inguinal hernia repair is one of the most common procedure performed all over the world in adults. The lifetime risk of developing an inguinal hernia has been estimated at 27% for men and 3% for women.[19] Due to easy recognition, as a palpable mass in the groin region, patients seek for doctor's consult. Usually, it is not a life-threatening condition and may be successfully treated with the surgical intervention. The emergency operation is necessary in cases of strangulation due to the possible complications such as intestinal necrosis, peritonitis and septic shock. Strangulation occurs in a large hernia with a small hernial orifice.

The risk factors for hernia formation may be divided into patient-related and external risk factors. Higher incidence of inguinal hernia is associated with older age, male gender, coexistence of hiatal hernia in men, lower body mass index and the Caucasian race.[20] Inverse relationship between obesity and lower risk of hernia may be a result of limitations in physical activity in obese patients. Recent studies suggest that smoking may be associated with the increased risk for hernia development due to the changes in collagen metabolism.[21,22]

Other patient-related factors identified as a potential risk factors for the formation of groin hernia include positive family history, chronic obstructive

pulmonary diseases, abdominal aortic aneurysm, patent processus vaginalis and other connective tissue disorders.[23-25]

External risk factors are identified with cumulative exposures to daily lifting activities (total load, frequent heavy lifting) and prolonged standing and walking.[26]

The most common symptom of this hernia is groin pain, although it may be absent in more than 30% of patients. Studies show that patients with an indirect hernia are more likely to present with pain than those with a direct hernia.[27] Only 1.5% of patients described their pain as severe at rest, and 10.2% during movements.[28]

A sudden appearance of severe pain usually indicates strangulation and is an emergency. Other symptoms that may be present include increased peristalsis, tenesmus, genital or abdominal pain, nausea and vomiting. A positive correlation between the presence of inguinal hernia and urinary tract symptoms has also been observed.[29] About 7% of patients of inguinal hernia remain asymptomatic.[30] For symptomatic patients usually no pre-operative imaging investigation is necessary, because physical examination is diagnostic. The physical examination is described as groin palpation in standing and supine positions with digital exploration of inguinal canal. The palpation should be performed in relaxed state and also in the situation of increased intra-abdominal pressure. Therefore, the patient should be asked to cough or to perform the Valsalva maneuver. The physical examination usually reveals a visible mass in the groin region that is easily palpable.

Performance of the ultrasonography, computed tomography or magnetic resonance imaging should be considered in cases of occult inguinal hernia. Ultrasonography is non-invasive and widely available and hence usually is the first choice test. The characteristic ultrasound finding is an abnormal intra-abdominal content (fat, bowel or both) of variable echogenicity in the groin region.[31] The proof for the ultrasound's effectivity is its high-level specificity (0.9980) and sensitivity (0.9758)

reported in recent studies.[32] If the results of ultrasonography do not reveal any abnormality, magnetic resonance imaging should be done in order to make the final diagnosis, as it is the most sensitive method in the diagnosis of occult inguinal hernia.[33]

Classification-

Traditionally inguinal hernia is classified as (a) direct (b) indirect, and (c) combined hernias, also known as pantaloon or Romberg or saddle bag hernias, depending on their relation to the inferior epigastric vessels. Direct inguinal hernia occurs medial to the inferior epigastric vessels when the abdominal contents herniate through a weak spot in the fascia of the posterior wall of inguinal canal, which is formed by the transversalis fascia. Indirect inguinal hernia occurs when abdominal contents protrudes through the deep inguinal ring, lateral to the inferior epigastric vessels. This may be caused by failure of embryonic closure of processus vaginalis. In the combined variety, hernia sacs are present on both sides of the inferior epigastric vessels. A direct inguinal hernia is less common (~25–30% of inguinal hernias) and usually occur in men

Type 1	Indirect inguinal hernia with a normal ring Sac in the canal
Type 2	Indirect hernia with an enlarged internal ring but the posterior wall is intact; inferior deep epigastric vessels not displaced, sac not in scrotum
Type 3a	Direct hernia with a posterior floor defect only
Type 3b	Indirect hernia with enlargement of internal ring and posterior floor defect
Type 3c	Femoral hernia
Type 4	Recurrent hernia A direct B indirect C femoral D combinations of A-B-C

NYHUS CLASSIFICATION IN INGUINAL HERNIA

over 40 years of age. A femoral hernia protrudes into the femoral canal through the fascia transversalis, medial to the femoral vein and below the inguinal ligament.

The Nyhus classification is the most widely used. According to anatomy, the Nyhus classification divides groin hernias into femoral and inguinal, which are subdivided into direct (medial) and indirect (lateral) based on their anatomical position to the inferior epigastric vessels.[34]

The European hernia society [EHS] devised an official classification for groin hernias which is simple and easy to remember. This classification mention both anatomical location and size of the hernia orifice as seen intra-operatively. It localizes the hernia anatomically as L = lateral, M = medial, F = femoral and measures the size of the hernia orifice using the tip of the index finger which is about 1.5- 2cm as shown in the table as 1 (≤1 finger), 2 (1-2 fingers), and 3 (≥3 fingers). Thus a hernia orifice of 2.5 cm is depicted as a size 2 hernia. This dimension is identical to the length of branches of a pair of most laparoscopic graspers, dissectors, or scissors enabling the surgeon to use the same classification during laparoscopic surgery.[35]

EHS Groin Hernia Classification		Primary	Recurrent		
	0	1	2	3	x
L					
M					
F					

Key: Primary = primary hernia, Recurrent = recurrent hernia, 0 = no hernia detectable, 1 = <1,5 cm (one finger), 2 = <3 cm (two fingers)

EHS Groin Hernia Classification

Surgical repair of inguinal hernia –

The aim of hernia repair is to reduce clinical symptoms, improve quality of life and prevent adverse complications to occur. In spite of its great incidence, hernias can pose a surgical dilemma, even for the skilled surgeon, as many pathologic conditions can masquerade as an inguinal

hernia. The unexpected hernial content and pseudo-hernias constitute some of these cases.[36]

All symptomatic hernias should be operated electively as the only cure is surgery. A minority of patients are asymptomatic. However, even a watch-and-wait approach in this group results in surgery in approximately 70% within 5 years. Surgical treatment is successful in the majority of cases.[37,38] The expected rate of recurrence following inguinal hernia repair is still 11% today.[39]

A major problem after inguinal hernia repair is chronic pain lasting more than 3 months, occurring in 10-12% of all patients.[37] Approximately 1-3% of patients have severe chronic pain with long-term disability, thus requiring treatment.

NON-OPERATIVE MANAGEMENT– Surgeons recommend surgery on diagnosis of a symptomatic inguinal hernia, as natural history of a groin hernia is that of progressive enlargement and weakening, with a potential to get incarcerated or strangulated. However, in patients with minimal symptoms, the clinician is faced with the balancing of risk of hernia-related complications, such as incarceration and bowel strangulation, with the hernia repair surgery related complications in the short and long term. Fitzgibbons and colleagues reported a prospective randomized trial of a watchful waiting strategy for men with asymptomatic or minimally symptomatic inguinal hernia. At 2 years of follow-up, there were no deaths attributed to the study, and the risk for hernia related complications in the watchful waiting group was extremely low, 0.3% of study participants or 1.8 events/1000 patient-years. Over time, almost 25% of patients assigned to watchful waiting crossed over to the surgical group, usually for the pain related to the hernia, that limited daily activity. In a later report, the crossover rate had increased to 68% at 10 years, with nearly 80% of men older than 65 years having an operation. Patients who underwent late surgery, did not have increased surgical site infections or higher recurrence rates than those who were initially assigned to early repair.[40]

A strategy of watchful waiting is safe for older patients with asymptomatic or minimally symptomatic inguinal hernias. Even though most patients eventually undergo repair, the operative risks and complication rates are no different from those of patients undergoing immediate repair. Watchful waiting can be a cost-effective management strategy for selected patients with no or minimal symptoms or who have suboptimal risk for operation.

OPEN TECHNIQUES of inguinal hernia repair- The open techniques are based on either pure tissue approximation or tension free mesh repair. The first effective inguinal hernia repair technique was described in 1887 by Edoardo Bassini. In this method, conjoint tendon and aponeurosis of the transverse abdominal muscle are sutured by single interrupted stitches to the inguinal ligament. The spermatic cord is placed above this reconstructed posterior wall of inguinal canal. Due to the fact, that the **Bassini method** had high recurrence rate, it was the basis for the creation of **Shouldice method** [41] In this technique, the transversalis fascia is incised from internal ring to the pubic crest and then these two layers are placed on each other. This method uses two continuous sutures, going back and forth, which supplies four lines of sutures. According to studies, Shouldice herniorrhaphy is the best non-mesh technique in terms of recurrence rate, that was estimated at 3.6%.[42]

In **McVay/Cooper's ligament repair**, the floor of the inguinal canal is reinforced by approximating the transversus abdominis aponeurosis and transversalis fascia to pectineal (Cooper's) ligament medially from the pubic tubercle to the femoral vein. Lateral to this, the floor is restored by approximating the femoral sheath to the inguinal ligament.

The **Desarda technique** is a suture-based technique. This technique is tension-free, mesh-free, and pays attention to surgical physiology of inguinal canal. Here the external oblique aponeurosis is sutured to the inguinal ligament and internal oblique to reinforce the posterior wall of the inguinal canal. It gives similar results to Lichtenstein repair in terms of

recurrence, with the significant benefit of not introducing permanent foreign-body material.[43]

The most popular open-mesh technique is the **Lichtenstein's method**, introduced in 1978 and usually uses the anterior approach to insert one layer polypropylene mesh as a strengthening material. The lateral edge of mesh is sutured to the inguinal ligament, while the medial end is stitched to the aponeurosis of internal oblique muscle and the transversalis muscle. Proximal end of mesh is incised in order to form two layers, that embrace the spermatic cord and secure the deep inguinal ring.[44]

In a Cochrane review comparing the open non-mesh Shouldice technique with other open techniques, a total of 2,566 hernias from 16 trials were analyzed in the open non-mesh Shouldice group and compared with 1,121 open mesh and 1,608 open non-mesh technique. The recurrence rate with Shouldice techniques was higher than with open mesh techniques (odds ratio (OR) 3.80; 95% confidence interval (CI) 1.99-7.26) but lower than with other non-mesh techniques (OR 0.62; 95% CI 0.45-0.85). There were no significant differences in chronic pain, complications, and postoperative stay.[42]

The development of videoscopic surgery brought new methods of hernia repair. Increasing need for excellent results along with patient satisfaction, have prompted the need to find out the best technique of laparoscopic inguinal hernia repair.

Advantages of using a laparoscopic approach over open repair is the ability to address all defects of the myo-pectineal orifice with the ability to deal with bilateral hernias through the same incisions.

The two main laparoscopic inguinal hernia repairs are the totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) repairs and each is regarded as tension-free and requires the use of mesh. When performed by a surgeon experienced in laparoscopic hernia repair, there are fewer complications than Lichtenstein's repair, particularly less chronic pain and numbness and return to usual activities is faster.[45]

Transabdominal Preperitoneal repair (TAPP), described by Arregui in 1992, and Total Extraperitoneal repair (TEP, described by McKernan and Laws in 1993. The main difference between the two repairs is the sequence of gaining access to the pre-peritoneal space. In the TEP approach, the dissection begins in the pre-peritoneal space using a balloon dissector. With the TAPP, the pre-peritoneal space is accessed after initially entering the peritoneal cavity. TAPP is relatively easy to learn but has the disadvantage in that the peritoneal cavity is breached and there is a possibility of bowel injury and bowel adhesions to the mesh.

TEP is technically difficult procedure to learn. The working space is more limited and the surgeon needs to be familiar with an unfamiliar anatomy. The advantage is of quicker access of pre-peritoneal space and direct approach to posterior defects and non-violation of peritoneal cavity.

For comparison of the open mesh technique with the laparo-endoscopic techniques, transabdominal preperitoneal mesh plasty (TAPP) and totally extraperitoneal mesh plasty (TEP), five meta-analyses were done.[46-50] Only in one meta-analysis, TEP and TAPP were jointly compared with the open mesh Lichtenstein technique.[49] No difference in the recurrence rates was found. However, a lower incidence of wound infection, an earlier return to normal activities or work, and a lesser incidence of chronic pain syndrome was detected.

In a prospectively documented registry-based study comparing 10,555 Lichtenstein repairs to 6,833 TEP repairs in primary unilateral inguinal hernias in men, no difference in recurrence rate, complication-related re-operation rate, and chronic pain rate requiring treatment was detected in the analysis. However, TEP was found to have benefits in regard to postoperative complication rate ($p < 0.001$), pain at rest ($p = 0.011$), and pain on exertion ($p < 0.001$).[51]

When comparing TEP and TAPP with the Lichtenstein mesh repair technique, a registry-based, propensity score-matched comparison of 57,906 patients with primary U/L inguinal hernia repair revealed

significantly less postoperative complications, complication-related re-operations, pain at rest, and pain on exertion in favor of TEP and TAPP. TEP showed disadvantages in terms of intraoperative complications.[52]

Two prospective randomized trials compared laparoscopic versus open mesh repair in bilateral inguinal hernia. Laparoscopic bilateral inguinal hernia repair was significantly quicker as well as less painful and allowed an earlier return to work.[53,54] Other comparative studies found additional advantages in terms of postoperative complications and hospital stay in favor of the laparoscopic approach.[55-57]

Various studies conducted to compare the efficiency of the two laparoscopic procedures of hernia repair, TAPP and TEP have been described in the past.

M. Gass et al [58] in 1998 in there population-based analysis comparing outcomes of patients with recurrent inguinal hernia undergoing TEP versus TAPP in a prospective cohort of over 1300 patients, found that intraoperative complications to be significantly higher in patients undergoing TEP. The TEP technique was found to be associated with longer operating times, but a shorter postoperative length of hospital stay. They concluded that the absolute outcome differences are small and thus, on a population-based level, both techniques appear to be safe and effective for patients undergoing endoscopic repair for unilateral recurrent inguinal hernia.

Asuri Krishna M. C. Misra et al [59] conducted a prospective randomized study in May 2007 and included 100 patients suffering from uncomplicated primary groin hernia. They concluded that, TEP had a significant advantage over TAPP for significantly reduced postoperative pain up to 3 months, which resulted in a better patient satisfaction score. The other intraoperative complications, postoperative complications, and cost to be similar in both groups. They concluded that In terms of results, both repair techniques seem to be equally effective, but TEP had an edge over TAPP.

Sharma D, Yadav K. et al[60] did a prospective randomized trial comparing TAPP and TEP approach for bilateral inguinal hernias and found out that the procedures that are different in approach were quite similar in outcome. Mean operating time to be increased in the TEP repairs along with immediate post-operative pain scores. The pattern of some complications like subcutaneous emphysema to be significantly more in the TEP group while minor vascular injury though not significant, different in both groups.

Laparoscopic inguinal hernia repair in the Armed Forces: A 5-year single centre study Brig C.K. Jakhmola A, Wg Cdr Ameet Kumar B [61], concluded that feasibility as well as safety of LIHS to be good as per the short and long term outcomes.

Flore Vãrcuæ et al [62] concluded that, despite the long learning curve needed; laparoscopic repair is feasible, safe, and provides good satisfaction to the patients. Differences between TEP and TAPP to be related to minor complications, no major difference found.

Kockerling et al [63] did a prospective analysis in patients with unilateral inguinal hernia to compare TEP and TAPP and they found out that the intraoperative and general postoperative complication rates as well as the reoperation rate for complications showed no significant difference between TEP and TAPP. The higher postoperative complication rate for TAPP in their study, which could be managed conservatively, was partly explained by larger defect sizes, more scrotal hernias and older age in the patients that were included in their study.

Wei FX et al [64] did a meta analysis to compare TEP and TAPP and concluded that TEP as a modified and more complex laparoscopic procedure than TAPP, their study did not yield any significant difference in aspects of clinical outcomes and complications. Therefore, they firstly recommended TAPP for laparoscopic hernia repair, especially for non expert surgeons. Further choices could be made according to the specific clinical characteristics of patients and surgeons.

Bansal VK et al [65] did a prospective comparison of long term outcomes following TEP and TAPP surgery and concluded that the TEP and TAPP techniques of laparoscopic repair of inguinal hernia have comparable long-term outcomes in terms of incidence of chronic groin pain, quality of life, and resumption of normal activities. Chronic groin pain had a significant correlation with preoperative pain and early postoperative pain. However, TAPP was associated with significantly higher incidence of early postoperative pain, longer operative time, and cord edema, whereas TEP was associated with a significant higher incidence of seroma formation. The cost was comparable between the two groups.

Meta analysis by Antoniou S. et al. comparing the laparo-endoscopic techniques TEP and TAPP demonstrate comparable outcomes.[66]

The rate of recurrent inguinal hernias is still 11% today. In the five meta-analysis comparing laparo-endoscopic versus open repair of recurrent hernias following previous open non-mesh and mesh procedures, the laparoscopic technique was associated with less wound complications and a faster recovery, whereas the recurrence rate was comparable between these two methods.[67-71]

In a registry-based study comparing TEP and TAPP for recurrent inguinal hernia repair, the results comparing intraoperative complications, complication-related re-operations, recurrences, pain at rest, pain on exertion, or chronic pain requiring treatment were equivalent in the two methods.[72]

Mean operating time has been compared in various studies. Increased operating time in TEP as compared to TAPP was attributed to limited working space and different appreciation of anatomical landmarks in a published randomized trial [73], meta-analysis [74] and a population based study.[75]

On the other hand, other authors have reported shorter time for TEP as compared to TAPP.[76] All studies, which have reported less operating time in TEP repair compared to TAPP repair, are for unilateral hernias.

Mesh fixation issue has been controversial in laparoscopic hernia repair. Some authors report that mesh fixation is not necessary in TEP repair.[77] The disadvantages quoted with mesh fixation are the risk of neuralgic complications and cost. However a few tacks at safe points for mesh fixation in both TAPP and TEP is a recommended step. More tacks are needed in the TAPP group as the inferior flap is also approximated using tacks. Many authors have an opinion that TAPP has increased incidence of post operative pain as compared to TEP due to use of tacks.

Post operative pain is the most common complaint after hernia surgery. The analgesic requirements were reported to be higher in the initials hours in the TEP group in the randomized trials by Schrenketal [73] and IEHS Guidelines 2011

Contrary to it, Bansal et al [65] observed less pain in the early post operative period after TEP in comparison to TAPP for unilateral hernia repair. Over the years pain has been reported to be less after TEP[78] considering less peritoneal irritation, which might have been misquoted as in a TEP repair, a small peritoneal rent is often overlooked, which may cause blood and fluid trickling to the peritoneal cavity, causing peritoneal irritation presenting as pain.

Few studies suggest local complications like haematoma, hydrocele, seroma, surgical emphysema are common after TEP.[79,80] Amongst these, seroma being the most common complication after laparoscopic inguinal hernia repair [81] and can mimic postoperative recurrence causing concern in patients. The incidence of seroma formation ranges between 1.9% to 11%.[81] However it can be as high as 41% during the initial few days.

Recurrence is the most important long-term determinant of success after inguinal hernia surgery. The reported rate of recurrence after TEP is around 1-2%, and after TAPP to be around 0-3%.[82,83]

After TAPP repair there is a slight risk for a late presentation with bowel obstruction either at the site of peritoneal flap closure with bowel intervening in it or due to adhesions at the port site. The Swedish National

inguinal hernia Register shows a slight higher rate of late postoperative bowel obstruction after TAPP compared to TEP.[84]

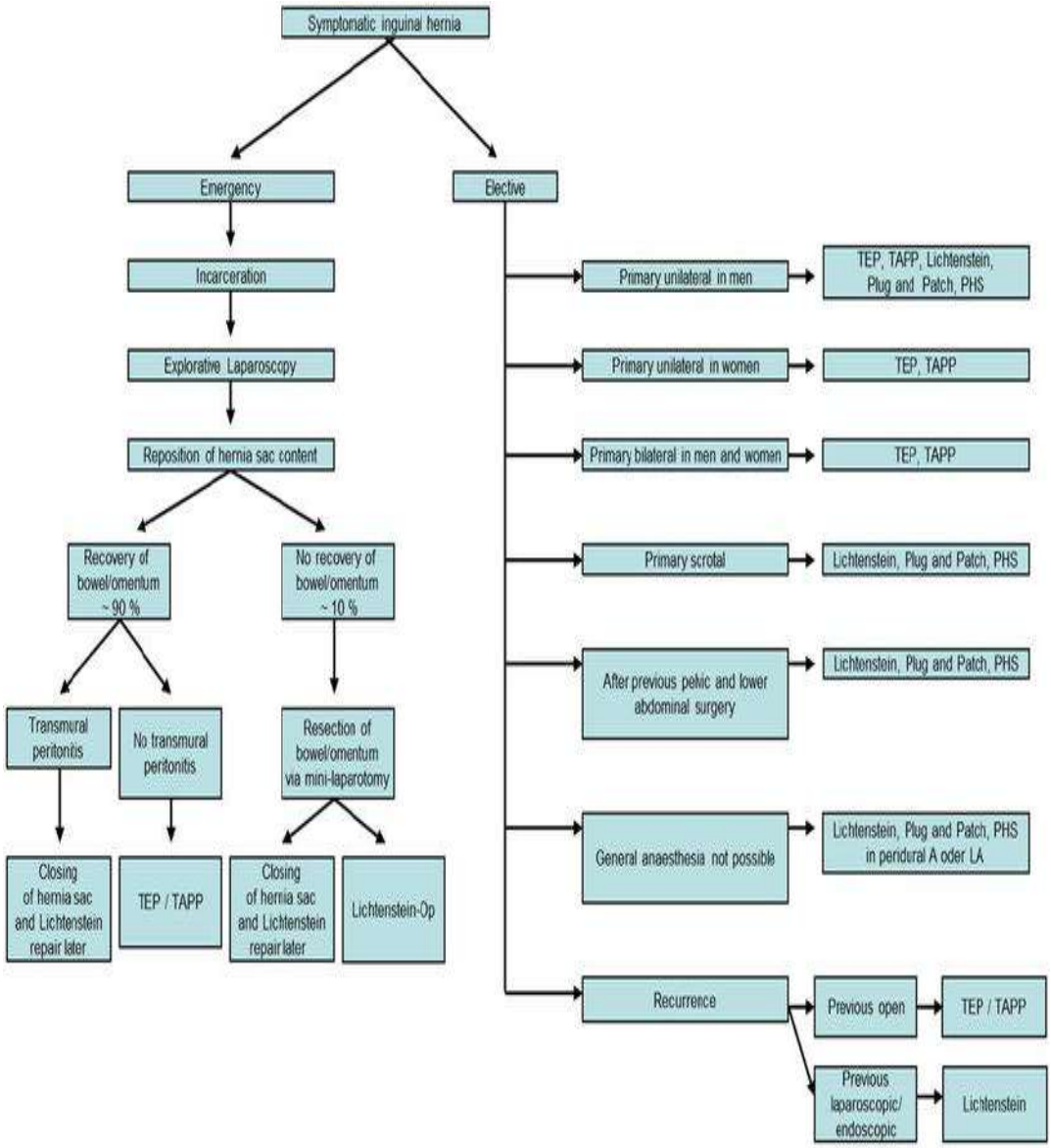
The European Hernia Society (EHS), The International Endo-hernia Society (IEHS), and the European Association for Endoscopic Surgery (EAES) collaborated in 2014 and developed a universal set of guidelines, for groin hernia management called the International Guidelines for Groin Hernia Management by the HerniaSurge Group [78,85-88], with the aim to improve the outcome of inguinal hernia repair by means of standardizing care.

In their International Guidelines, the HerniaSurge Group strongly recommends a mesh-based repair technique for all patients with inguinal hernia.

The HerniaSurge Group recommends the Shouldice technique in cases of non-mesh inguinal hernia repair. Non-mesh repair for inguinal hernia can be done in cases where the patient refuses a mesh, after shared decision, or in low-resource settings with non-availability of mesh.

The HerniaSurge Group recommends a laparo-endoscopic technique for male patients with primary U/L inguinal hernia because of lower postoperative pain and comparable complication-related re-operations equivalent to the open Lichtenstein’s repair, provided that a surgeon with sufficient expertise is available. However, there are patient and hernia characteristics that may warrant the Lichtenstein technique as the first choice.

The HerniaSurge Group recommends in their Guidelines that the choice of the technique between TEP or TAPP, should be based on the surgeon's skills, education, experience and preference.



Tailored approach in inguinal hernia repair according to the guidelines of Herniasurge group.

TEP/TAPP is the recommended approach of hernia repair in primary unilateral /bilateral inguinal hernia in men and women.

The aim of this study is to evaluate TAPP and TEP in regards of intra operative complications, duration of surgery, postoperative pain scores, complications like seroma, hematoma formation, hospital stay and hernia recurrence.

MATERIALS AND METHODS

The study was conducted in the Department of Surgery, Dayanand Medical College and Hospital, Ludhiana. Patients coming to DMCH having inguinal hernia between 1st January 2018 to 31st March, 2019 were included in the study. A follow up period of 3 months was kept upto 30th June, 2019.

Source of Data

Patients with uncomplicated symptomatic unilateral/bilateral inguinal hernia attending the surgical outpatient department of Dayanand Medical College and Hospital from Jan 2018 till 31st March, 2019 were screened for inclusion in the study. The diagnosis of inguinal hernia was made clinically, patients with obvious clinical evidence of unilateral/bilateral inguinal hernia were included in the study.

METHOD OF COLLECTION OF DATA

Laparoscopic TAPP and TEP surgeries were done according to the standard procedural guidelines. Pre operative, Intra operative and Post operative parameters were recorded on a pre-structured proforma. Relevant demographic parameters, procedure related parameters and post operative parameters were recorded.

INCLUSION CRITERIA

- Primary inguinal hernia
- Recurrent hernia
- Unilateral or Bilateral inguinal hernia
- Age > 18 and < 70 yrs

EXCLUSION CRITERIA-

- Patients unfit for general anaesthesia.
- Obstructed/ Strangulated hernia
- Uncorrected coagulopathy.

1. Inclusion and exclusion criteria was applied to patients presenting to the Department of Surgery, Dayanand Medical College Hospital, Ludhiana only.
2. Patients fulfilling the inclusion and exclusion criteria were taken into the study.
3. Patients were educated about the study and only those patients consenting to participate in the study were included. Written informed consent were taken from every participant included in the study.
4. Patients were included for TEP (group A) and TAPP (group B) as per the Surgeon's choice of operative technique.
5. Database collection included documentation of medical history, age, sex, symptoms with duration, vital signs, abdominal signs and drug history.
6. Post-operative stay of the patient was noted.
7. Outcome of the patient was noted in the immediate post operative period in respect to various pre structured data and till 3 months of the laparoscopic hernia repair for any chronic pain or recurrence.

Data was recorded on a pre-structured proforma, including-

Demographic and clinical data:

Continuous variables: age, weight was recorded.

Categorical variables: sex, presenting complaints, hernia type, any factor contributing to hernia formation like chronic cough, any co-morbid condition like Diabetes mellitus, Hypertension, H/O any lower urinary tract symptoms were recorded.

Procedure related data:

Continuous variables: Operative time (recorded as time from the first incision till closure of last port skin incision)

Categorical variables: Contents of hernia sac, intra-operative complications, like injury to cord structures, injury to blood vessel.

3) Conversion to open or to other laparoscopic approach.

4) Postoperative Recovery:

Continuous Data: Pain scores (recorded on a visual analog scale (VAS) where 0 indicated no pain and 10 indicated the worst possible pain) , time of stoppage of injectable analgesics, time to return of bowel movements and hospital stay.

5) Postoperative Complications: Seroma formation, wound infection, scrotal edema.

6) Recurrence of hernia at 3 months.

7) Morbidity if any

INGUINAL HERNIA

Inguinal hernia is defined by a protrusion through the anterior abdominal wall fascia. Patient-related factors linked to ventral hernia formation include obesity, older age, male gender, sleep apnea, emphysema, and prostatism.

RISK FACTOR:

Certain Conditions pre disposing to the development of hernia include-

1. Genetic**:** Hernias can run in families. There are genetic abnormalities of collagen fibers in muscles and fascia (the thick lining of muscle) which could increase the risk of hernia formation. Some studies have shown that some patients with hernia are more likely to have a mismatch of collagen, with more of the Type III, immature, weaker, collagen, and less of the Type I collagen, which is more mature and stronger. Also, their collagen is laid in a pattern that is not organized. There are also some Inherited Connective Tissue disorders (such as Ehlers-Danlos and Marfan`s Syndrome which make the patient more prone to development of hernia.
2. Gender: Men are at a greater risk of hernia than women.
3. Obesity: The obesity increases the risk of hernia formation especially after another abdominal surgery. It also increases risk of recurrence of hernia after a hernia repair surgery.

4. Heavy Lifting: Work-related injuries could be associated with hernia development. Lifting heavy weights on a regular basis at work has the potential of increasing intra-abdominal pressure leading to hernia formation.
5. Cough, Bronchitis, Asthma: Coughing has been shown to raise your abdominal pressure much more than any type of heavy lifting which could exert a lot of pressure on the abdominal wall. Patients who cough due to smoking, bronchitis, asthma, COPD, acid reflux, or post-nasal drip are having higher risk of inguinal hernia.
6. Smoking: Smoking if it is associated with coughing can increase the risk of hernia formation. Smoking is also associated with decreased wound healing and therefore increase the risk of hernia recurrence or post-op wound complication after a hernia repair.
7. Constipation: The straining associated with constipation severely increases intra-abdominal pressure which could increase the risk of hernia formation. Therefore, a low fibre diet which could result in constipation also is associated with higher risk of hernia formation.
8. Pregnancy and Labor: Pregnancy alone causes an increase abdominal pressure. There is no direct evidence to suggest that this pressure can cause hernias, but certainly if there is a hernia or a tendency toward one, that may present as a bulge during pregnancy. The pressure that is exerted during labor is much more severe. Women who have undergone labor are slightly more likely to have hernias than those that did not.
9. Enlarged Prostate or Straining to Urinate: If the prostate is enlarged, men tend to strain to make the weak urinary stream faster or to completely empty their bladder at the end of their stream. Similar to constipation, this can result in increased intra-abdominal pressure and a tendency toward hernia formation. In women, straining to urinate may occur in those with prolapsed bladder or cystocele.

10. Sleep Apnea: This has been correlated with various factors that lead to increased hernia risk. The cause is unknown, but may be due to poor oxygenation and health of the tissues as well as the pressure from snoring against a closed airway.
11. Steroids, Immune Suppression or Chemotherapy: Steroids, immune modulator drugs, anti-rejection medications, and chemotherapy agents which decrease the wound healing process, may all be associated with a higher risk of hernia development. These include patients who undergo organ transplantation, patients who receive chemotherapy and patients on chronic steroids or immune modulators for other problems, such as rheumatoid arthritis or lung problems.
12. Ascites: Patients with ascites, usually due to liver failure, are at very high risk of hernia development. Ascites causes an increase in abdominal pressure, resulting in stretching out of the naturally occurring holes in the abdomen.
13. Diabetes: Patients with diabetes have problems with healing.
14. Sports or traumatic injury
15. Premature birth : Premature infants have higher risk of hernia

SYMPTOMS: Inguinal hernia is noticed by the patient as a bulge in the anterior abdominal wall. They can be exagerrated by any action that raises intra abdominal pressure including coughing performing a Valsalva maneuver, lifting weights or by elevation of the head or legs. Occasionally patients reports pain or discomfort associated with their hernia which often resolves with rest or reduction of hernia. But this relief is only temporary. Smaller hernias are frequently asymptomatic or may produce occasional complaints. Discomfort or a bulge is the most common initial symptom but bowel obstruction can also be the first symptom that needs the patient to seek medical attention. Incarceration and strangulation is more common if the hernia neck defect is small so that it makes reduction of the hernia contents difficult.

INDICATION FOR SURGERY: Inguinal hernia in adults does not spontaneously heal or close and almost all enlarge as time progresses. In majority of patients if they are an ideal surgical candidate the presence of a hernia itself is an indication for repair and it allows for the potentially dangerous sequelae of incarceration obstruction or strangulation, to be avoided. Pain and limitations of daily activities are the most important indications for repair, whereas, cosmetic complaints are seen as least important. Nearly 25% of repairs are performed in asymptomatic patients in an attempt to avoid serious consequences. As stated, hernias tend to increase in size over time therefore delaying repair will often make it more complicated

PREPARATION FOR SURGERY

A complete patient evaluation consists of thorough history and physical examination. Pulmonary and cardiac co-morbid conditions diabetes and other medical problems need to be identified and addressed to. The physical examination would be straight forward in patients who have hernias with well defined fascial borders. An ultrasound scan can also be helpful if the presence of a hernia is debatable such as in an obese patient and if it is located in an unusual location or if there have been several failed attempts at repair of the herniation. Patients must be interrogated for any symptoms of incarceration such as pain nausea vomiting and constipation.

If the patient has recurrent hernia, information regarding the size and location of the original hernia, and the type and location of any prosthetic mesh used must also be obtained. Obese patient has a higher risk for recurrence and should be considered for weight-loss methods or counseling should be given before or around the time of hernia repair, however the majority might not be able to lose weight.

At the time of surgery, patients must receive second generation cephalosporin, and should be dose adjusted to patient weight and should be repeated if the operation lasts longer than 4 hours. Placing a gastric or

bladder catheter should be optional depending on the operative location length of surgery and the extent of intestinal manipulation. Polypropylene mesh was used in all cases of hernia repair in both the groups.

Procedure and Patient preparation-

Relevant history and physical examination findings were noted. Diagnosis of inguinal hernia was made on the basis of clinical examination. Findings of general physical examination and specific systemic examination were recorded in detail along with the following Investigations-:

1. Complete blood count
2. Renal function test
3. Liver function test
4. Random blood sugar
5. Coagulation profile
    - Prothrombin time/ INR
6. Chest X-ray
7. Ultrasound abdomen
8. ECG

PRE- ANAESTHETIC CHECKUP: A written informed consent was taken from all the patients. A thorough pre anesthetic checkup was conducted preoperatively, one day prior to the surgery. It comprised of detail history, general physical examination and relevant systemic examination of all the patients. Routine investigations like haemogram, renal function test, liver function test, serum electrolytes, random blood sugar and electrocardiogram, chest xray, coagulation profile, urine routine were checked prior to surgery for fitness for general anaesthesia.

PRE MEDICATION

All the patients were kept fasting for at least 6 hours pre-operatively, on the night before the surgery. Following premedication were given to all patients: 1. Tab. Alprazolam 0.25 mg at night before surgery and 0.25mg at 6.00 am on morning of operation day, orally with a sip of water. 2. Tab.

Ranitidine 150 mg at night before surgery and Tab Ranitidine 150 mg at 6.00 am on morning of operation day, orally, with a sip of water.

OPERATIVE TECHNIQUE

Technique of TAPP repair – After induction of GA, parts cleaned and draped. Pneumoperitoneum of 12-14 mmHg created with CO2, using a Veress needle at the infra-umbilical incision. A standard 10 mm trocar placed 1 cm below the umbilicus for insertion of the laparoscope into the peritoneal cavity . Two additional 5-mm trocars are placed approximately 5–6 cm on either side of the umbilicus at the lateral border of the Rectus Abdominis muscle at the level of the umblicus. The contents of the inguinal hernia (if any) reduced back into the abdomen. The peritoneum is incised lateral to the inferior epigastric vessels, 2 cm above the deep ring, extending transversely medially until the medial umbilical ligament, to enable the formation of a peritoneal flap. The dissection is carried on to identify Cooper's ligament and the space of Retzius and the lateral wall of the urinary bladder. The lateral limit of dissection corresponds to the anterior superior iliac spine. Inferiorly, the peritoneal flap is raised to identify the cord structures, triangle of doom, psoas major muscle, femoral branch of genitofemoral nerve, and lateral cutaneous nerves. Adequate space is created to accommodate 15 x 10 cm polypropylene mesh. After the dissection, the mesh is rolled and introduced via the 10 mm umbilical port into the space created. The mesh is then unrolled to cover the entire myopectineal orifice on the affected side (covering the femoral, direct, and indirect sites of the hernia). Peritoneum is closed with Vicryl 3.0 sutures. Port site is closed with Vicryl 2.0 suture for subcutaneous tissue and Ethilon 2.0 for skin.

TEP technique- After the induction of anaesthesia , parts cleaned and draped. Here all three port incisions are made in the midline. A 10 mm port just below the umbilicus is made for the 30 degree telescope. The rectus muscle is retracted laterally after incising the anterior rectus sheath and a blunt dissection is done for the telescope to create preperitoneal space. A

dissecting balloon is inserted above the posterior rectus sheath and advanced to the pubic symphysis . Balloon is inflated under direct laparoscopic guidance. The space is insufflated and additional two 5-mm ports are inserted, one just above the pubic symphysis and the other in the midline between umbilical port and pubic symphysis. The pubic symphysis is the first anatomical landmark recognized. The dissection proceeded laterally, identifying the inferior epigastric vessels and further laterally to correspond to the anterior superior iliac spine. The dissection is proceeded further exposing the deep ring, triangle of doom, psoas major muscle, and the nerves. The peritoneum is teased down as low as possible. The femoral/direct hernia are easily reduced before identifying the inferior epigastric vessels. The indirect hernia sac is reduced completely if the sac is incomplete; the hernia sac is divided after ligation if it is a complete hernia. The mesh is introduced via the umbilical port (as described in TAPP). The mesh is unrolled and left in the preperitoneal space, adequately covering the deep inguinal ring, Hasselbach's triangle, and femoral hernia sites.

POST OPERATIVE MANAGEMENT –

Injection of Diclofenac 75 mg I/V was given for postoperative pain relief and where there is a contraindication, injection Tramadol was given. Oral fluids and normal diet was introduced as per the return of bowel functions.

STATISTICAL ANALYSIS

Data was described in terms of range; mean ± standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables was done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test was performed and exact test was used when the expected frequency is less than 5. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations was

done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

OPERATIVE DATA – Type of hernia was classified as unilateral/bilateral, direct/indirect, complete/incomplete hernia. Content of hernia sac was recorded. Any intraoperative complications like vascular, nerve, or injury to vas deferens, peritoneal laceration, and visceral injuries were recorded on a pre-structured proforma. The operative time was recorded as the time from the first incision until the last skin closure. Any conversions from TEP to TAPP and from laparoscopic to open repair were recorded

.In post-operative data, pain was recorded at 8, 16, 24, 32, 40 and 48 hours after the surgery, at the time of discharge, and during follow-up based on a visual analog scale (VAS) where 0 indicated no pain and 10 indicated the worst possible pain. The need for injectable analgesics, postoperative time to resume feeding, return of bowel activity, postoperative hospital stay was recorded. Complications, including seroma formation, scrotal edema and wound infections were recorded.

Follow up was done at 1 week, 1 month and 3 months and any chronic pain or reoccurrence of hernia was seen.

OBSERVATION AND RESULTS

The study was conducted in the Department of Surgery, Dayanand Medical College and Hospital, Ludhiana for a period of one year and three months i.e. from "January 1st, 2018 to 31st march, 2019. In this study, 54 patients underwent inguinal hernia repair with laparoscopic techniques. Out of this 27 patients underwent laparoscopic trans-abdominal pre peritoneal repair and other 27 patients underwent laparoscopic totally extra peritoneal repair of inguinal hernia.

TABLE 1- AGE AND SEX WISE DISTRIBUTION OF THE PATIENTS UNDER STUDY

		Surgery				Total	Chi-square value	p-value
		TAPP		TEP				
AGE GROUP	18-30	10	37%	9	33%	19	0.311	0.856
	31-50	10	37%	12	44%	22		
	51-70	7	26%	6	22%	13		
Total		27	100%	27	100%	54		

TABLE 2- MEAN AGE OF THE PATIENTS UNDER STUDY

	TAPP		TEP		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
AGE	40.04	15.40	39.00	14.82	0.252	0.802	-7.22	9.29

In our study, all the patients were male in both the groups. Mean age of presentation in the TAPP group was 40.04 years with SD of 15.40 and in the TEP group was 39.00 years with SD of 14.82. Of the 27 patients in the TAPP group, 37 % (n=10) patients were in 18-30 years age group, 37% (n=10) patients in 31-50 years age group, 26% (n=7) patients were in 51-

70 years age group. In the TEP group, of the 27 patients, 33% (n=9) patients were in 18-30 years age group, 44% (n=12) patients in 31-50 years age group, 22% (n=6) patients were in 51-70 years age group. There was no statistically significant difference in terms of age and sex between the two groups (p- 0.856)

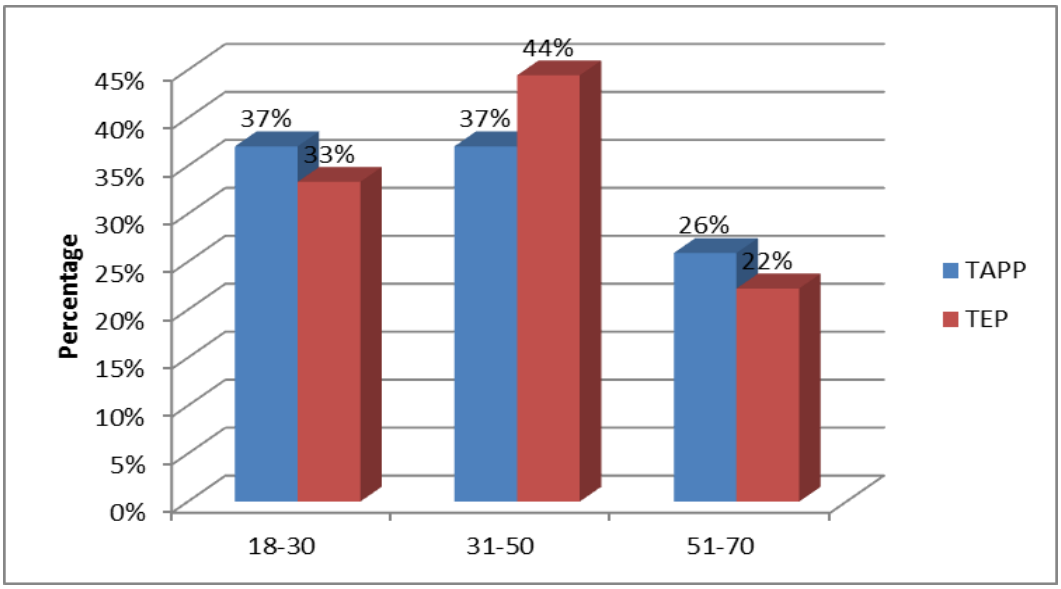


FIGURE 1- AGE DISTRIBUTION OF THE PATIENTS UNDER STUDY

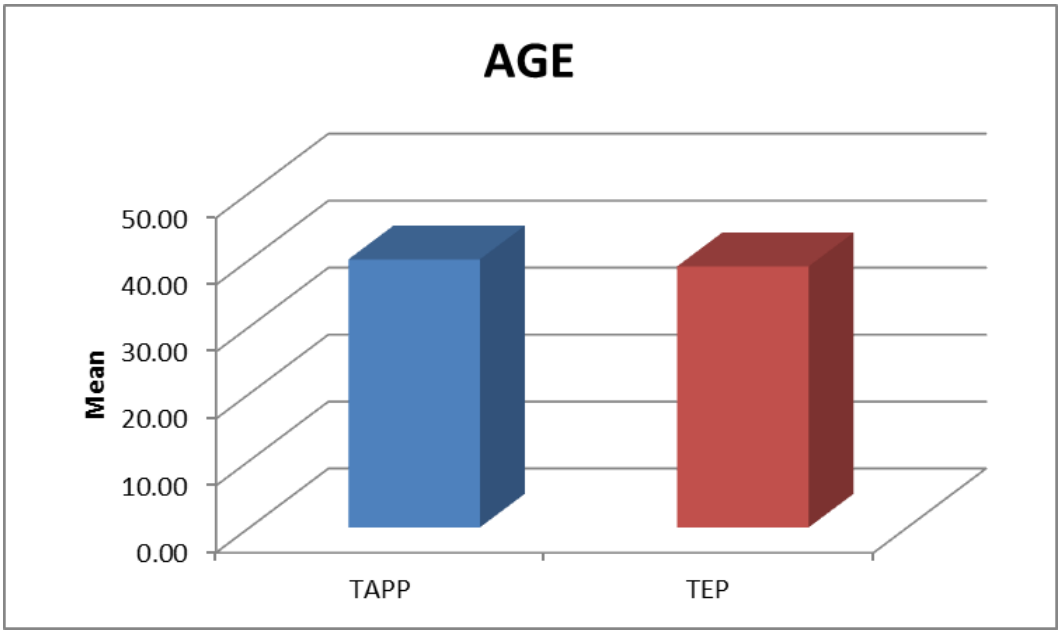


FIGURE 2- MEAN OF AGE IN THE TWO STUDY GROUPS

TABLE 3- DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SYMPTOMS

		Surgery				Total	Chi-square value	p-value
		TAPP		TEP				
Duration group	< 1 month	4	15%	7	26%	11	0.311	0.856
	< 1years	15	56%	10	37%	25		
	> 1 years	8	30%	10	37%	18		
Total		27	100%	27	100%	54		

In the TAPP group, onset of symptoms of pain and swelling in less than 1 month was seen in 15% (n=4 cases), onset of symptoms within 1 year was seen in 56% (n= 15 cases), and onset of symptoms in more than 1 year was seen in 30%(n= 8 cases). In the TEP group , onset of symptoms in less than 1 month was seen in 26% (n=7 cases), onset of symptoms within 1 year was seen in 37% (n= 10 cases), and onset of symptoms in more than 1 year was seen in 37%(n= 10 cases). Both the study groups were comparable in terms of duration of onset of symptoms, the difference being not statistically significant (p-value= 0.856)

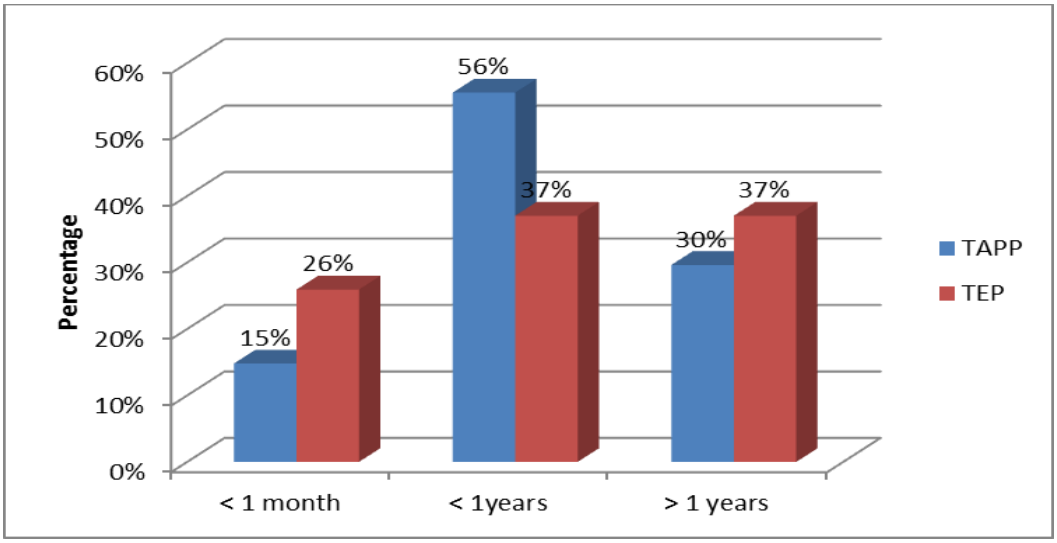


FIGURE 3- DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SYMPTOMS

TABLE 4- DISTRIBUTION OF PATIENTS ON THE BASIS OF H/O PROLONGED COUGH, CONSTIPATION, URINARY SYMPTOMS

		Surgery				Total	Chi-square value	p-value
		TAPP		TEP				
H/O OF PROLONGED COUGH/ CONSTIPATION/ URINARY SYMPTOM	N	25	93%	24	89%	49	0.220	0.639
	Y	2	7%	3	11%	5		
Total		27	100%	27	100%	54		

In the TAPP group, H/O of prolonged cough, constipation, urinary symptom was present in 7% (n=2) patients, and 93% (n=25) patients had no such symptoms.

In the TEP group, H/O of prolonged cough, constipation, urinary symptom was present in 11% (n=3) patients, and 89% (n=24) patients had no such symptoms.

The two groups were comparable in this respect and the difference was not statistically significant (p value = 0.639)

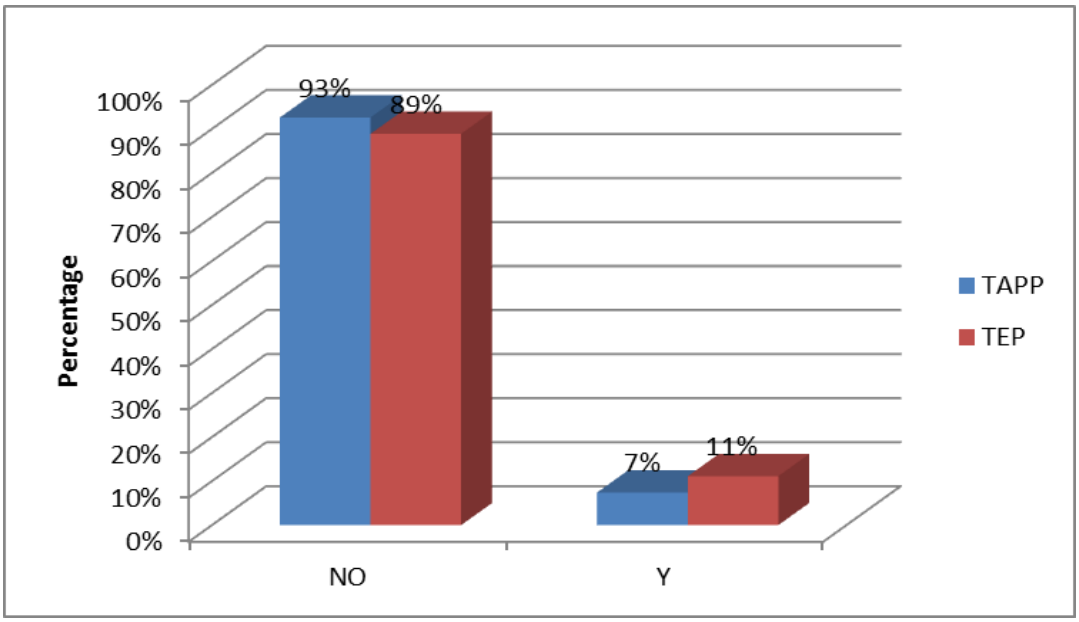


FIGURE 4- DISTRIBUTION OF PATIENTS ON THE BASIS OF H/O PROLONGED COUGH, CONSTIPATION, URINARY SYMPTOM

TABLE 5- DISTRIBUTION OF PATIENTS ON THE BASIS OF HISTORY OF ALCOHOL ABUSE/ SMOKING-

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
PERSONAL HISTORY	NO RELEVANT HISTORY	20	74%	22	81%	42	0.429	0.513
	Y	7	26%	5	19%	12		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, 26% patients (n=7) has history of some drug abuse like smoking, alcohol or opiod dependence and 74% patients (n=20) has no such history. In the TEP group, 19% patients (n=5) has history of some drug abuse like smoking, alcohol or opiod dependence and 81% patients (n=22) has no such history. The difference was not statistically significant (p-value=0.513)

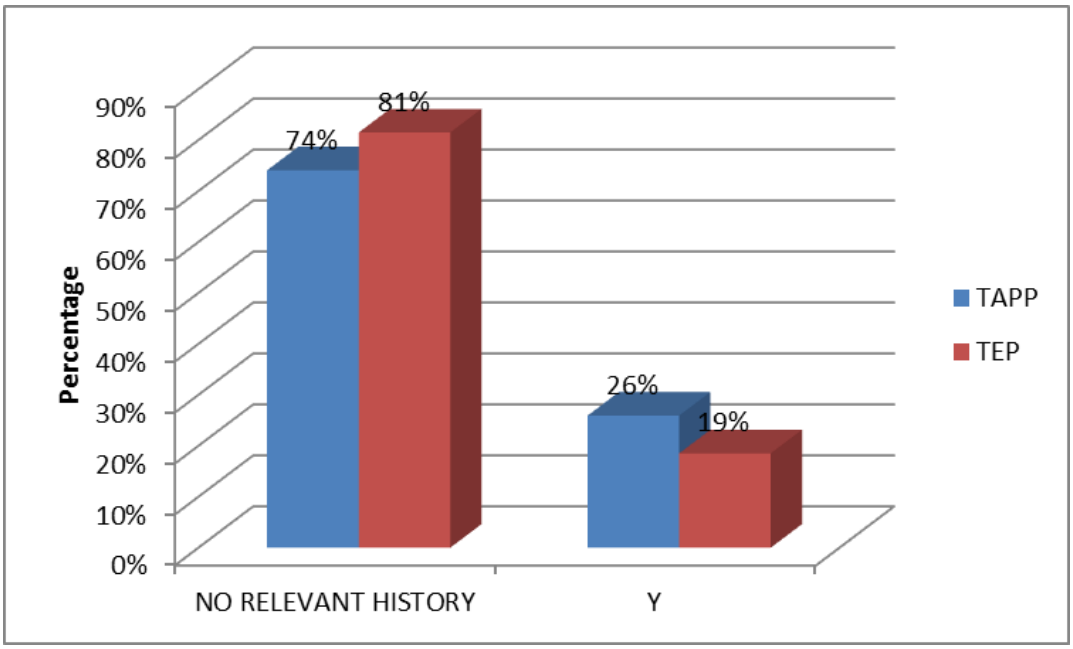


FIGURE 5- DISTRIBUTION OF PATIENTS ON THE BASIS OF HISTORY OF ALCOHOL INTAKE/SMOKING

TABLE 6- DISTRIBUTION OF PATIENTS ON THE BASIS OF PAST HISTORY OF ANY COMORBIDITY LIKE DIABETES/ HYPERTENSION/ COPD –

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
PAST HISTORY	NO RELEVANT HISTORY	22	81%	21	78%	43	0.114	0.735
	Y	5	19%	6	22%	11		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, 19% patients (n=5) has H/O comorbidities like Diabetes, Hypertension , COPD, old CVA etc and 81% patients (n=22) has no such history. In the TEP group, 22% patients (n=6) has H/O comorbidities like diabetes, hypertension , COPD, old CVA etc and 78% patients (n=21) has no such history . The difference was not statistically significant (p-value=0.735)

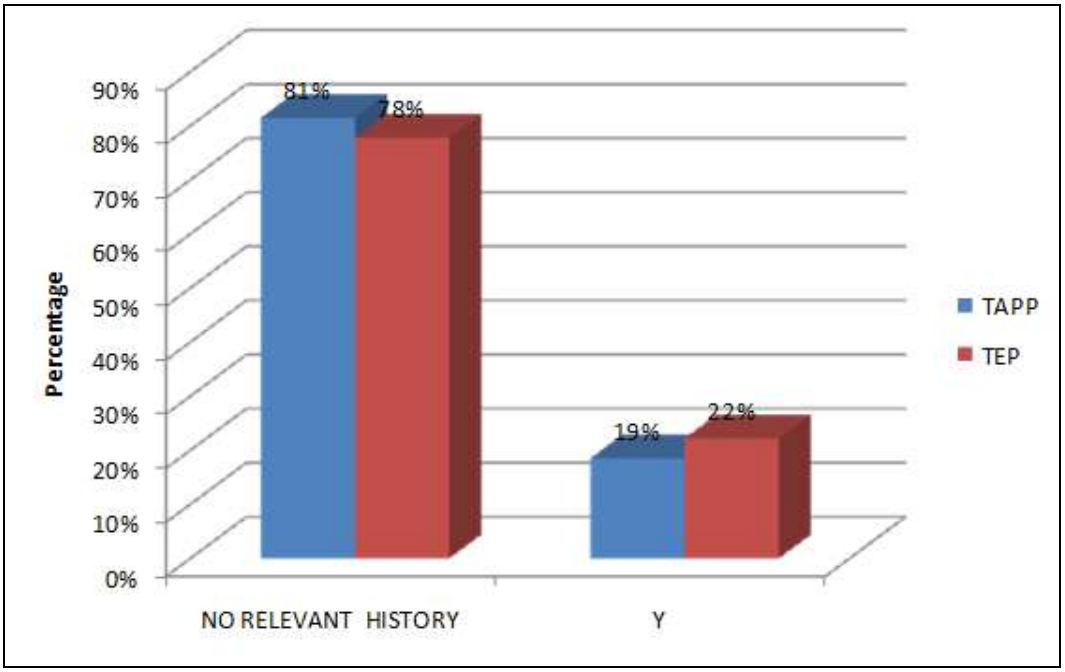


FIGURE 6- DISTRIBUTION OF PATIENTS ON THE BASIS OF PAST HISTORY OF ANY COMORBIDITY

TABLE 7- DISTRIBUTION OF PATIENTS ON THE BASIS OF CONSISTENCY OF SWELLING

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
CONSISTENCY	DOUGHY	23	85%	21	78%	44	0.491	0.484
	SOFT	4	15%	6	22%	10		
Total		27	100%	27	100%	54		

In this study, in the TAPP group, the consistency of swelling was soft in 15% (n=4) patients, and doughy in 85% (n=23) patients. In the TEP group, the consistency of swelling was soft in 22% (n=6) patients, and doughy in 78% (n=21) patients. The difference between the two groups was not statistically significant (P-value=0.484)

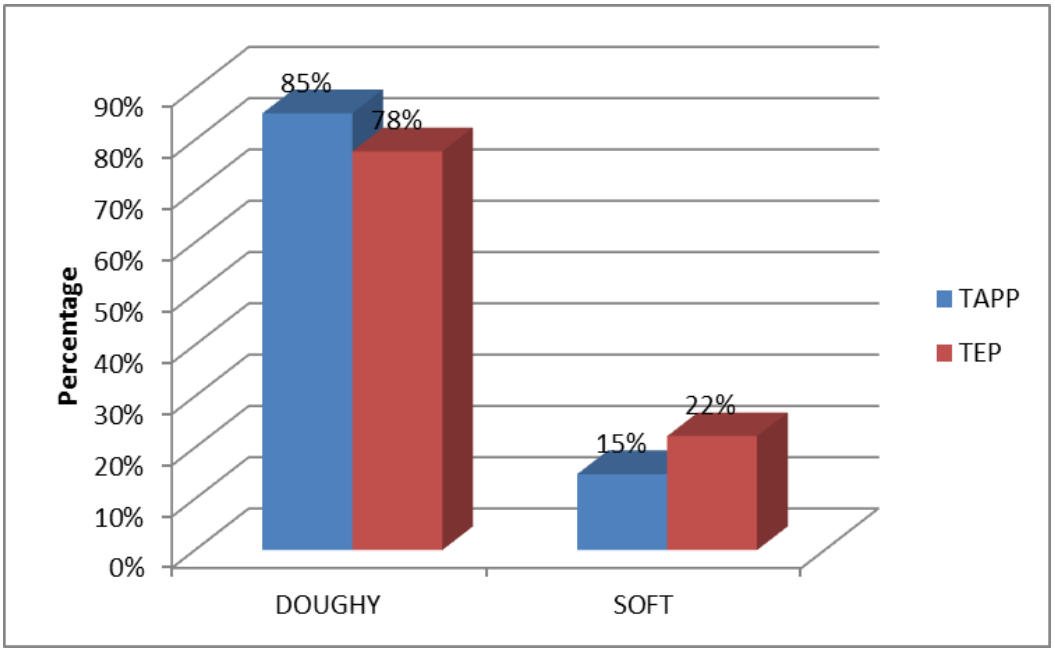


FIGURE 7- DISTRIBUTION OF PATIENTS ON BASIS OF CONSISTENCY OF SWELLING

TABLE 8- DISTRIBUTION OF PATIENTS ON THE BASIS OF REDUCIBILITY OF SWELLING

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
REDUCIBILITY	IRREDUCIBLE	3	11%	1	4%	4	1.080	0.299
	REDUCIBLE	24	89%	26	96%	50		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, swelling was reducible in 89% (n=24) patients, and irreducible in 11% (n=3) patients. In the TEP group, swelling was reducible in 96% (n=26) patients, and irreducible in 4% (n=1) patients. The difference between the two groups was not statistically significant (p-value=0.299)

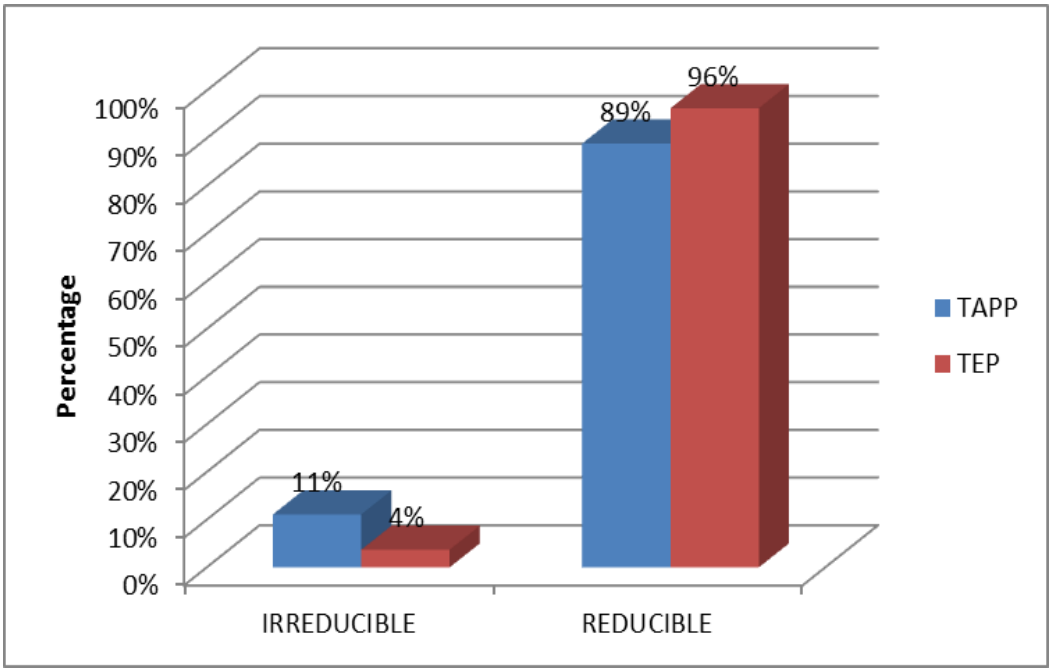


FIGURE 8- DISTRIBUTION OF PATIENTS ON THE BASIS OF REDUCIBILITY OF SWELLING

TABLE 9- DISTRIBUTION OF PATIENTS ON THE BASIS OF COUGH IMPULSE

		Surgery				Total
		TAPP	TAPP	TEP	TEP	
IMPULSE ON COUGHING	PRESENT	27	100%	27	100%	54
Total		27	100%	27	100%	54

In our study, impulse on coughing was present in 100% (n=27) patients, in both the TEP and TAPP groups. Both the groups were comparable in this respect.

TABLE 10- DISTRIBUTION OF PATIENTS ON THE BASIS OF PERCUSSION

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
PERCUSSION	DULL	24	89%	21	78%	45	1.200	0.273
	RESONANT	3	11%	6	22%	9		
Total		27	100%	27	100%	54		

In this study, in the TAPP group, 89% (n=24) patients had dull note on percussion and 11% (n=3) patients had resonant note on percussion. In the TEP group, 78% (n=21) patients had dull note on percussion and 22% (n=6) patients had resonant note on percussion. The difference between the two groups was not statistically significant (p-value=0.273).

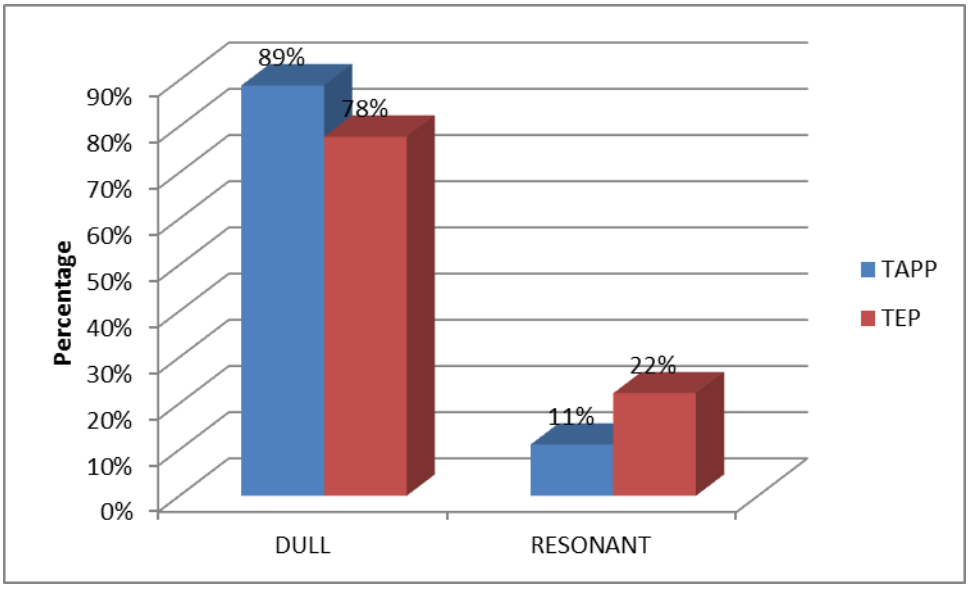


FIGURE 9- DISTRIBUTION OF PATIENTS ON THE BASIS OF PERCUSSION

INTRA-OPERATIVE FINDINGS-

TABLE 11- DISTRIBUTION OF PATIENTS ON THE BASIS OF UNILATERAL OR BILATERAL HERNIA

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
UNILATERAL OR BILATERAL	B	5	19%	9	33%	14	1.543	0.214
	U	22	81%	18	67%	40		
Total		27	100%	27	100%	54		

In this study group, in the TAPP group, (n=22) 81.0% patients had unilateral hernia, (n=5) 19% patients had bilateral hernia. In the TEP group, (n=18) 67.0% patients had unilateral hernia, (n=9) 33% patients had bilateral hernia.

The difference between the two groups was not statistically significant. (p-value=0.214)

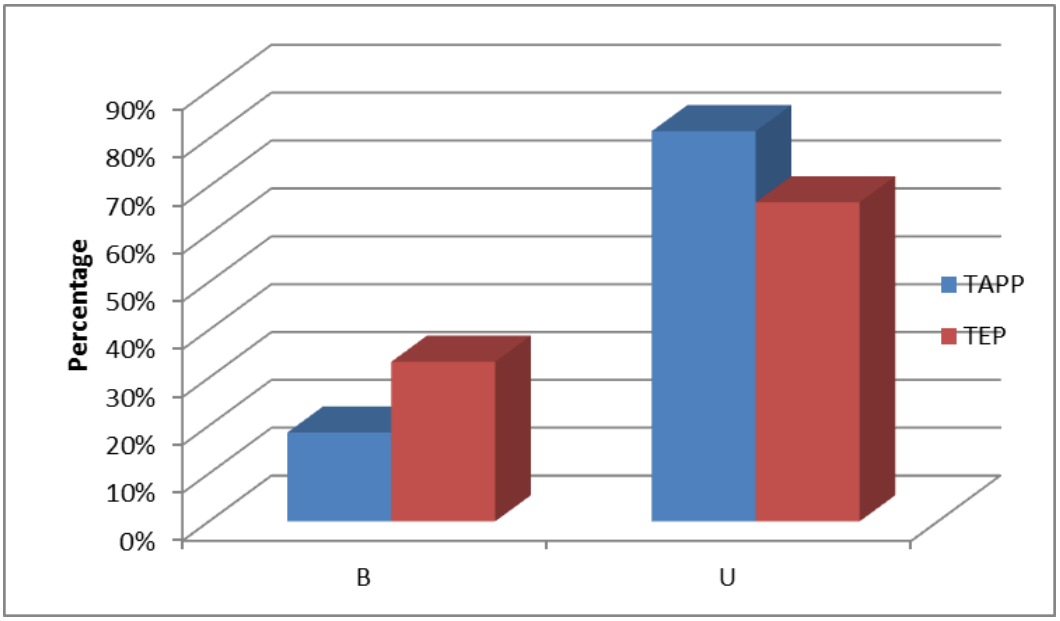


FIGURE 10- DISTRIBUTION OF PATIENTS ON THE BASIS OF UNILATERAL OR BILATERAL HERNIA

TABLE 12- DISTRIBUTION OF PATIENTS ON THE BASIS OF UNILATERAL RIGHT OR LEFT INGUINAL HERNIA

		Surgery				Total	Chi-square value	p-value
			TAPP		TEP			
SIDE	B/L	5	19%	9	33%	14	3.65	0.161
	LEFT	5	19%	8	30%	13		
	RIGHT	17	63%	10	37%	27		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, n=5(19%) patients had B/L hernia, n=5(19%) patients had left inguinal hernia and n=17(63%) patients had right inguinal hernia. In the TEP group, n=9(33%) patients had B/L hernia, n=8(30%) patients had left inguinal hernia and n=10(37%) patients had right inguinal hernia. The difference in respect to side of inguinal hernia was not significant among the two groups. (p-value=0.161)

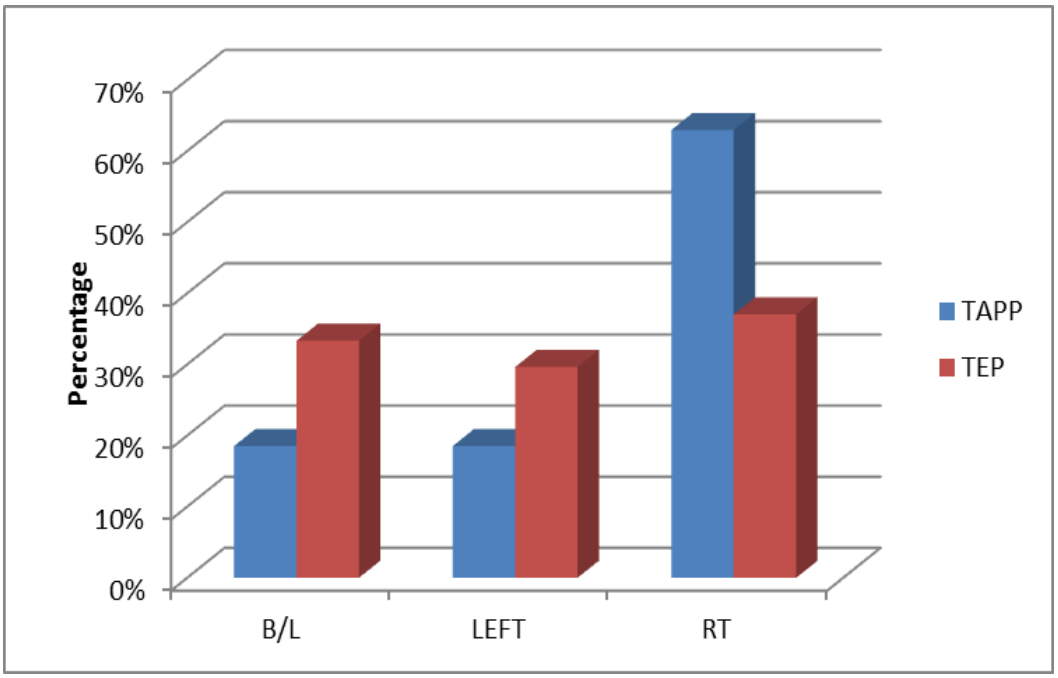


FIGURE 11- DISTIBUTION OF PATIENTS ON THE BASIS OF SIDE OF INGUINAL HERNIA

TABLE 13- DISTRIBUTION OF PATIENTS ON THE BASIS OF TYPE OF HERNIA-

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
TYPE OF HERNIA	DIRECT	6	22%	10	37%	16	1.421	0.233
	INDIRECT	21	78%	17	63%	38		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, 22% patients (n=6) had direct hernia and 78 % (n=21) patients had indirect hernia. In the TEP group, 37% patients (n=10) had direct hernia and 63% (n=17) patients had indirect hernia.
The difference was not statistically significant (p-value=0.233).

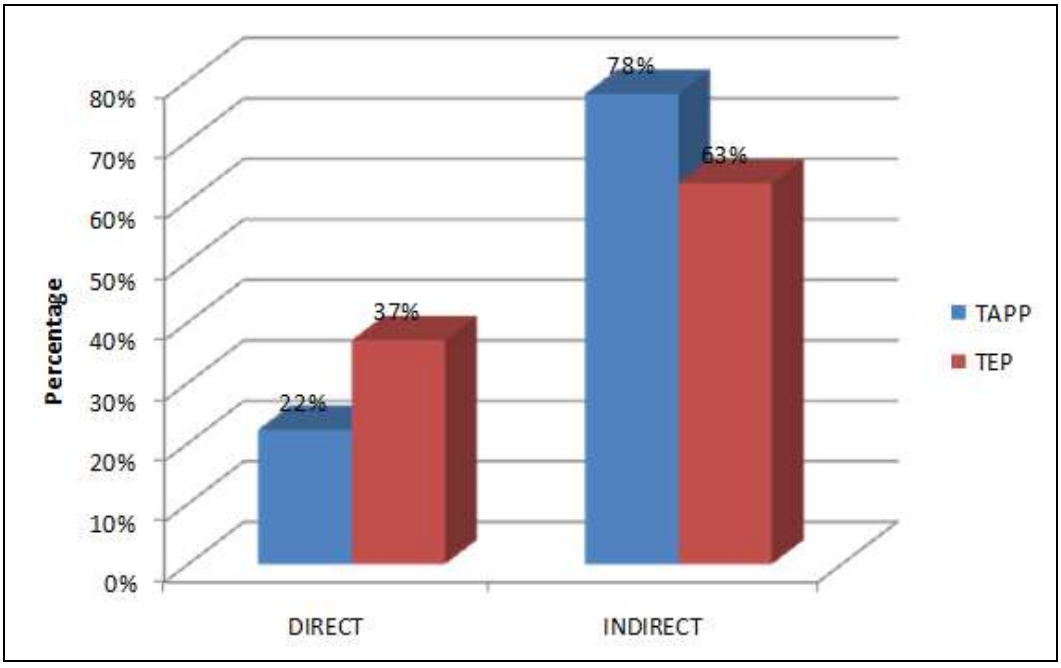


FIGURE 12 - DISTRIBUTION OF PATIENTS ON THE BASIS OF TYPE OF HERNIA

TABLE 14- DISTRIBUTION OF PATIENTS ON THE BASIS OF COMPLETE OR INCOMPLETE HERNIAL SAC

		Surgery				Total	Chi-square value	p-value
			TAPP		TEP			
EXTENT	COMPLETE	6	22%	6	22%	12	0.000	1.000
	INCOMPLETE	21	78%	21	78%	42		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, 22% (n=6) patients had complete hernial sac and 78% (n=21) patients had incomplete hernial sac. In the TEP group, 22% (n=6) patients had complete hernial sac and 78 % (n=21) patients had incomplete hernial sac. There was no statistical difference between the two groups. P-value=1.000

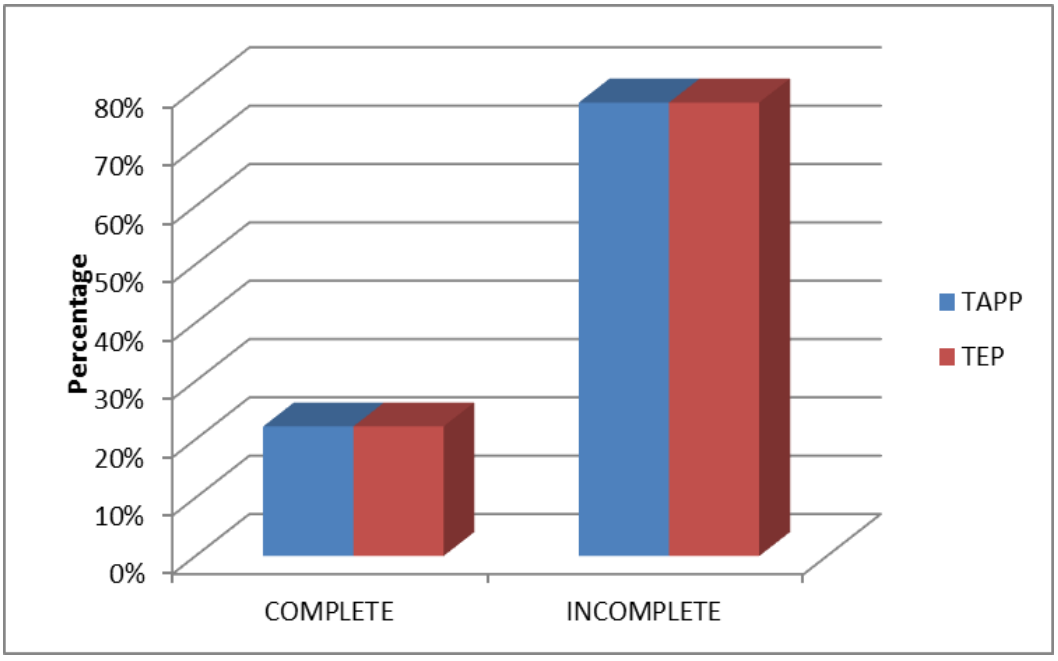


FIGURE 13 - DISTRIBUTION OF PATIENTS ON THE BASIS OF COMPLETE OR INCOMPLETE HERNIAL SAC

TABLE 15- DISTRIBUTION OF PATIENTS ON THE BASIS OF CONTENT OF THE HERNIAL SAC

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
Content	INTESTINE	3	11%	3	11%	6	0.000	1.000
	OMENTUM	24	89%	24	89%	48		
Total		27	100%	27	100%	54		

In our study, in the TAPP group, n=3(11%) patients had gut as content and n=24 (89%) patients had omentum as the content. In the TEP group n=3 (11%) patients had gut as content and n=24 (89%) patients had omentum as the content. There was no statistical difference is respect to content of hernia sac in the two groups.

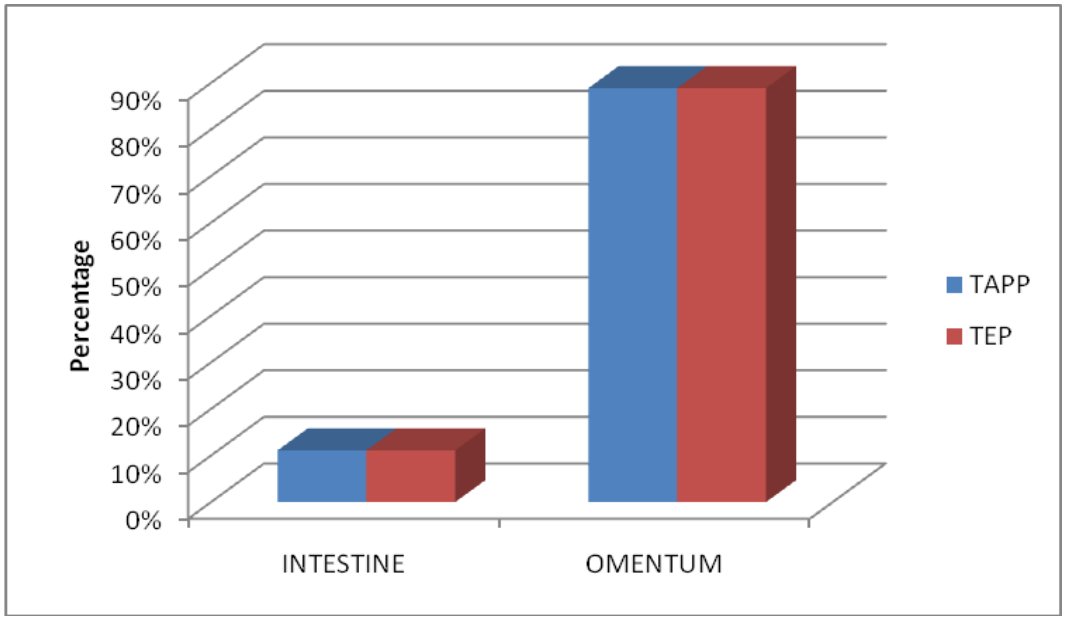


FIGURE 14- DISTRIBUTION OF PATIENTS ON THE BASIS OF CONTENT OF THE HERNIAL SAC

TABLE 16 A - DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SURGERY IN UNILATERAL INGUINAL HERNIA CASES

UNILATERAL	TAPP (n=22)		TEP (n=18)		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
DURATION OF SURGERY(MIN)	91.16	5.68	84.97	6.62	3.182	0.003	2.250	10.123

In our study, in the total 40 cases of unilateral hernia, in the TAPP group having n=22 cases, the mean duration of surgery was 91.16 minutes with standard deviation of 5.68. In the TEP group having n=18 cases, the mean duration of surgery was 84.97 minutes with standard deviation of 6.62. The difference was statistically significant with the p-value of 0.003.

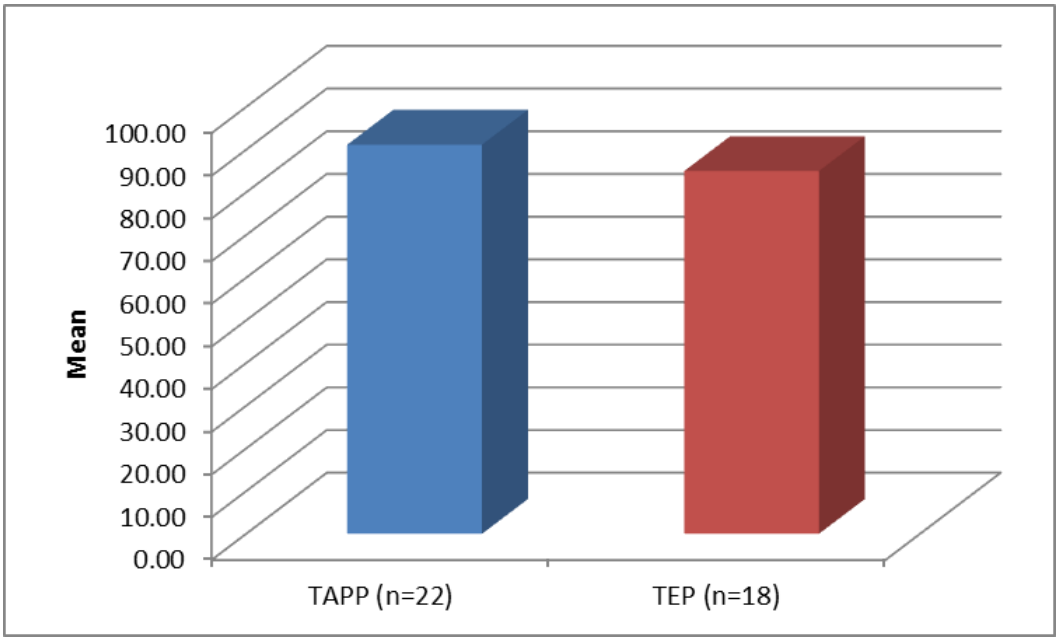


FIGURE 15A - DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SURGERY IN UNILATERAL INGUINAL HERNIA CASE

TABLE 16 B - DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SURGERY IN BILATERAL INGUINAL HERNIA CASES

BILATERAL	TAPP (n=5)		TEP (n=9)		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
DURATION OF SURGERY(MIN)	112.00	6.00	103.61	6.25	2.437	0.031	0.890	15.888

In our study, in the total 14 cases of bilateral hernia , in the TAPP group having n=5 cases of bilateral hernia, the mean duration of surgery was 112.00 minutes with standard deviation of 6.00 . In the TEP group having n=9 cases of bilateral hernia, the mean duration of surgery was 103.61 minutes with standard deviation of 6.25 . The difference was statistically significant with the p-value of 0.031.

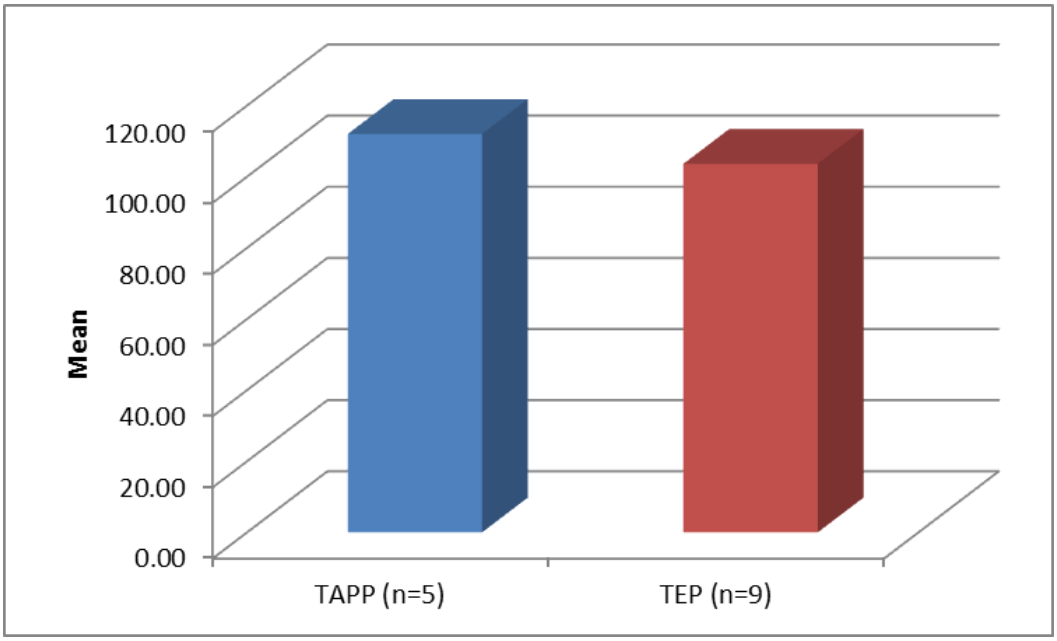


FIGURE 15 B - DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF SURGERY IN BILATERAL INGUINAL HERNIA CASES

TABLE 17- DISTRIBUTION OF PATIENTS ON THE BASIS OF CONVERSION TO OTHER SURGICAL TECHNIQUE

		Surgery				Total
		TAPP	TAPP	TEP	TEP	
Conversion to other surgical technique	NIL	27	100%	27	100%	54
Total		27	100%	27	100%	54

There were no conversions to other surgical technique in any of the two groups. All the operations in either study group of TAPP and TEP were completed successfully, without the need of conversion to other surgical technique.

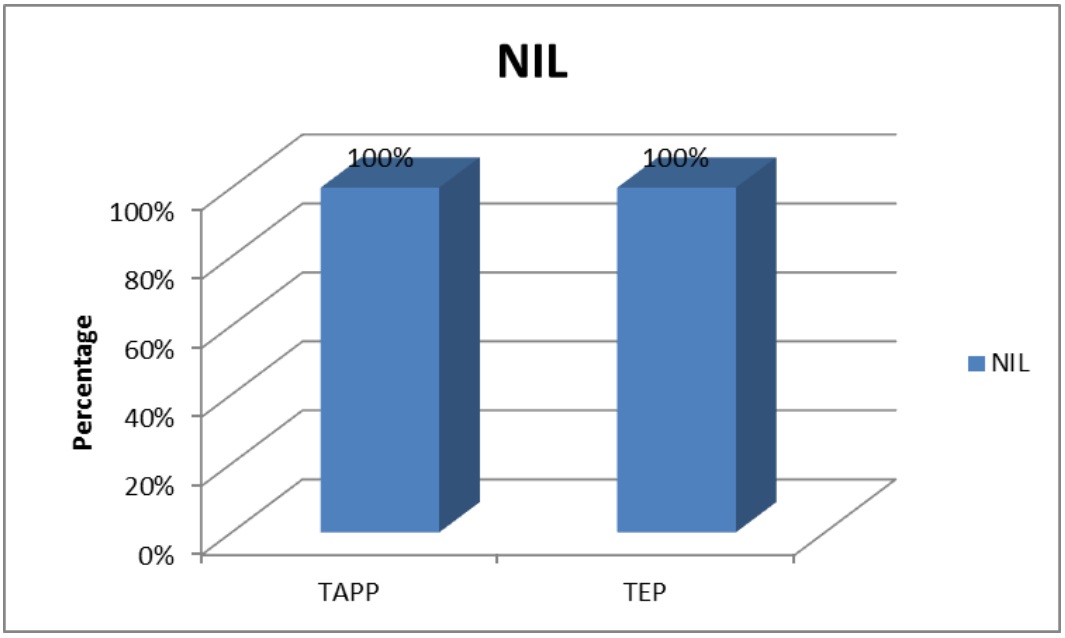


FIGURE 16- DISTRIBUTION OF PATIENTS ON THE BASIS OF CONVERSION TO OTHER SURGICAL TECHNIQUE

TABLE 18 - DISTRIBUTION OF PATIENTS ON THE BASIS OF ANY INTRA OPERATIVE INJURY

		Surgery				Total
		TAPP	TAPP	TEP	TEP	
INTRA OPERATIVE INJURY	NIL	27	100%	27	100%	54
Total		27	100%	27	100%	54

In our study, there was no incidence of any intra operative injury to any major blood vessel, nerve or to the intestine in either of the study group of TEP and TAPP.

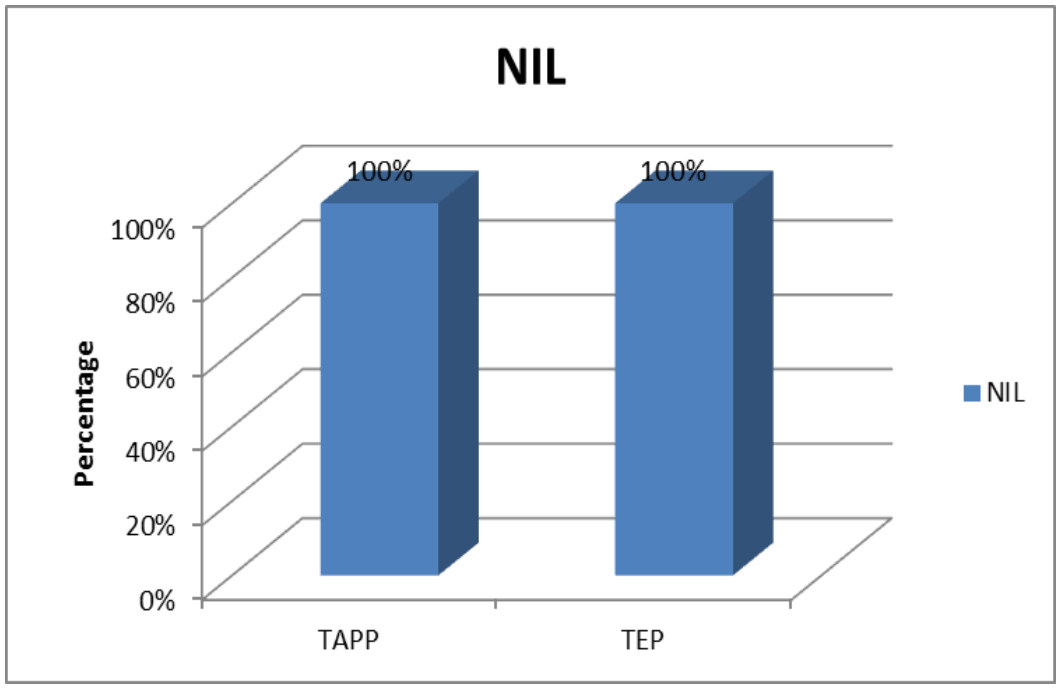


FIGURE 17- DISTRIBUTION OF PATIENTS ON THE BASIS OF ANY INTRA OPERATIVE INJURY

POST OPERATIVE DATA -

TABLE 19- DISTRIBUTION OF PATIENTS ON THE BASIS OF POST-OPERATIVE PAIN SCORES FROM 0-10

	TAPP		TEP				95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Z	p-value	Lower	Upper
VAS_8 hours	6.37	0.56	6.15	0.46	1.591	0.118	-0.06	0.50
VAS_16 hours	5.00	0.68	4.63	0.69	1.991	0.052	0.00	0.74
VAS_24 hours	3.56	0.75	3.19	0.56	2.058	0.045	0.01	0.73
VAS_32 hours	2.30	0.61	2.04	0.44	1.798	0.078	-0.03	0.55
VAS_40 hours	1.61	0.50	1.45	0.52	0.830	0.412	-0.22	0.53
VAS_48 hours	1.00	0.00	1.00	0.00		1		

PAIN SCORES IN TAPP AND TEP GROUP AT 8, 16, 24, 32, 40, 48 HOURS

In our study, the mean pain score was calculated at 8, 16, 24, 32, 40, 48 hours in both the study groups. There were higher pain scores in TAPP group at all levels of measurement from 8 hours to 40 hours.

Mean of the pain scores at 24 hours of measurement was 3.56 with SD of 0.75 on VAS scale in the TAPP group. Mean of the Pain scores at 24 hours of measurement was 3.19 with SD of 0.56 on VAS scale in the TEP group. This difference was statistically significant with p-value of 0.045.

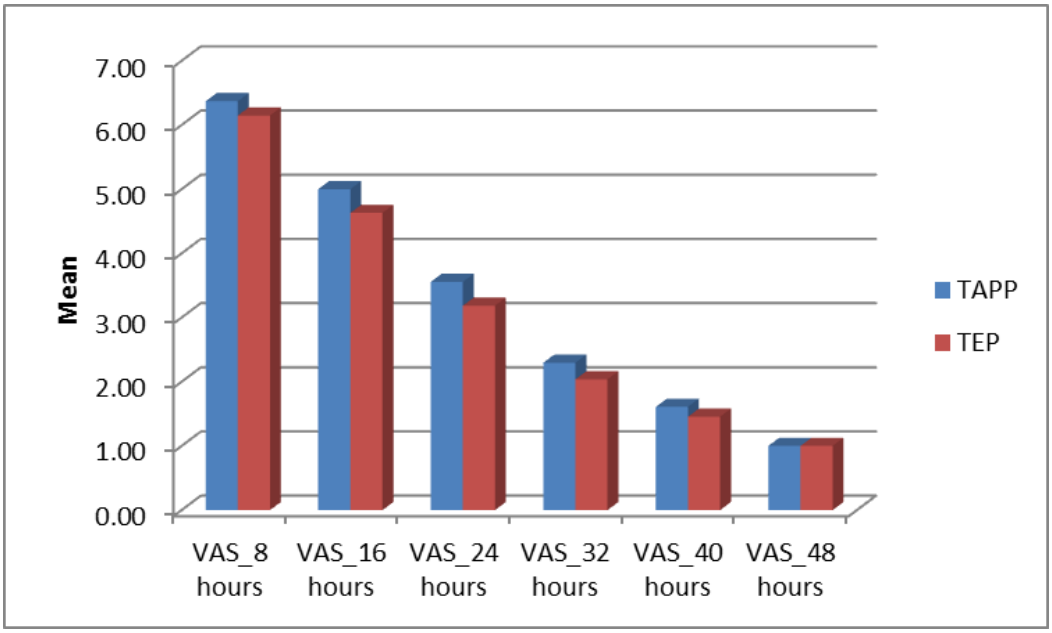


FIGURE 18- DISTRIBUTION OF PATIENTS ON THE BASIS OF POST-OPERATIVE PAIN SCORES FROM 0-10

TABLE 20- DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF INJECTABLES ANALGESICS REQUIRED POST SURGERY

	Surgery				Total	Chi-square value	p-value
	TAPP		TEP				
16-24 HRS	2	7%	3	11%	5	0.220	0.639
24-32 HRS	21	78%	22	81%	43	0.144	0.735
32-40 HRS	4	15%	2	7%	6	0.750	0.386

In our study, injectable analgesics requirement was calculated in each patient.

TABLE 21- DISTRIBUTION OF PATIENTS ON THE BASIS OF MEAN DURATION OF INJECTABLES ANALGESICS REQUIRED POST SURGERY

	TAPP		TEP		Z	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
Injectable requirement	30.22	3.11	27.85	3.13	2.792	0.007	0.67	4.07

In the TAPP group, the mean duration of injectable analgesics requirement was 30.22 hours with SD of 3.11. In the TEP group, the mean duration of injectable analgesic requirement was 27.85 hours with SD of 3.13. The requirement of injectable analgesics was significantly higher in the TAPP group than the TEP group (p-value=0.007).

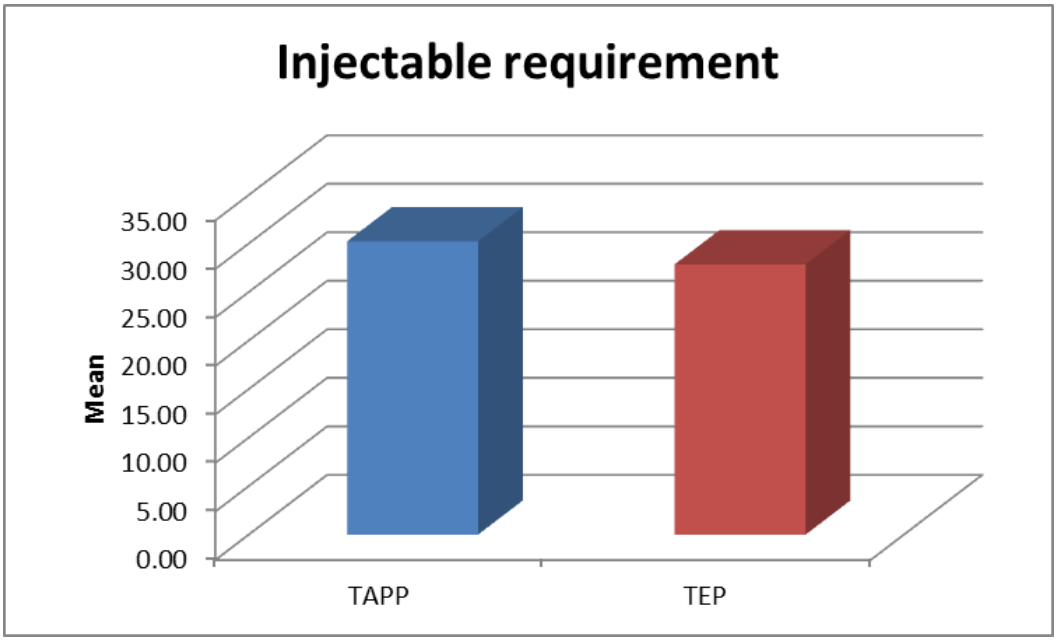


FIGURE 19- DISTRIBUTION OF PATIENTS ON THE BASIS OF DURATION OF INJECTABLES ANALGESICS REQUIRED POST SURGERY

TABLE 22- DISTRIBUTION OF PATIENTS ON THE BASIS OF RETURN OF BOWEL FUNCTION IN THE POST-OPERATIVE PERIOD-

	TAPP		TEP		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
RETURN OF BOWEL FUNCTIONS IN HRS	25.11	4.68	22.96	4.01	1.809	0.076	-0.23	4.53

In our study, in the TAPP group, mean time for return of bowel function was 25.11 hours with SD of 4.68. In the TEP group, mean time for return of bowel function was 22.96 hours with SD of 4.01. Though the mean time for return of bowel function was more in TAPP than TEP, but the difference could not achieve statistical significance (p-value=0.076)

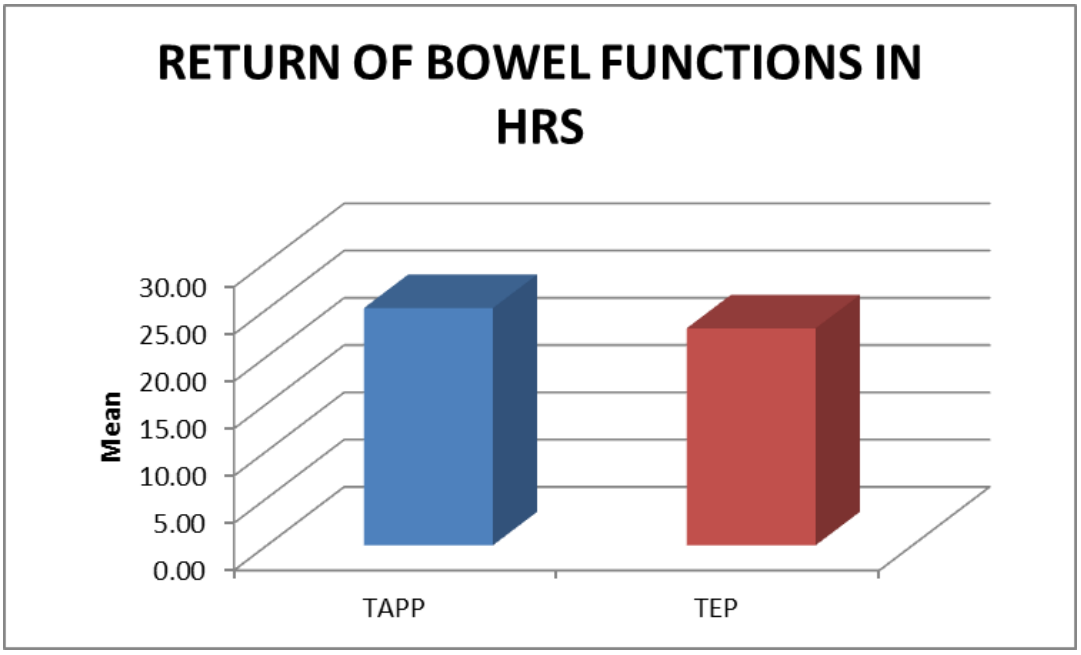


FIGURE 20- DISTRIBUTION OF PATIENTS ON THE BASIS OF RETURN OF BOWEL FUNCTION IN THE POST-OPERATIVE PERIOD-

POST OPERATIVE COMPLICATIONS-

TABLE 23- DISTRIBUTION OF PATIENTS ON THE BASIS OF SCROTAL EDEMA

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
SCROTAL EDEMA	NO	24	89%	25	93%	49	0.220	0.639
	YES	3	11%	2	7%	5		
Total		27	100%	27	100%	54		

In our study, in the TAPP group having 27 patients, scrotal edema was found in n=3 (11%) patients and in the TEP group, scrotal edema occurred in n=2 (7%) patients. Rest of the patients had no scrotal edema. Though scrotal edema occurred more in TAPP group but the difference was not statistically significant (p-value=0.639)

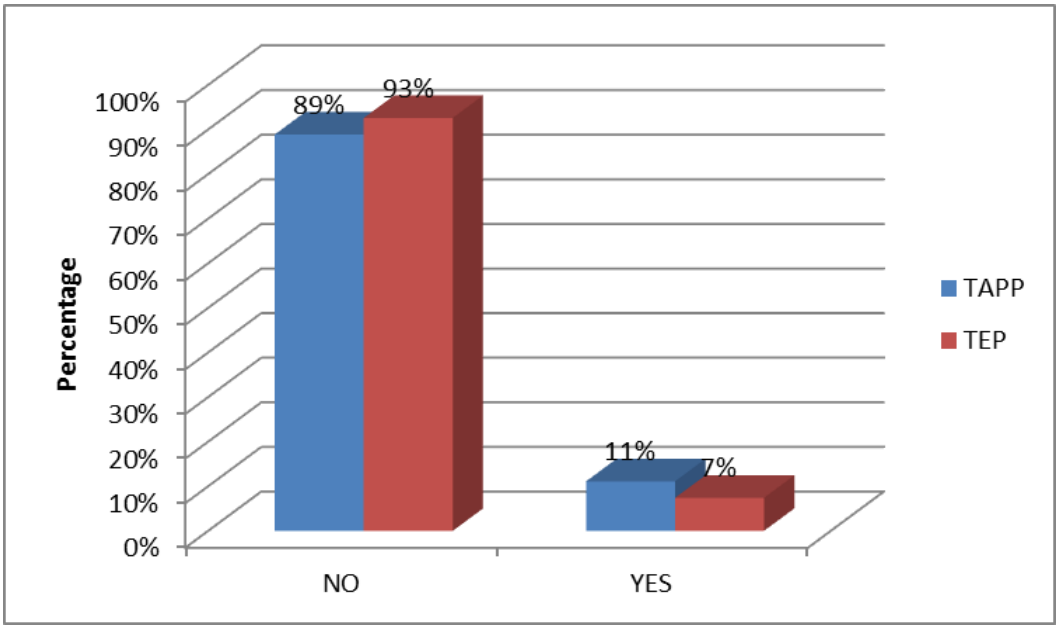


FIGURE 21- DISTRIBUTION OF PATIENTS ON THE BASIS OF SCROTAL EDEMA

TABLE 24- DISTIBUTION OF PATIENTS ON THE BASIS OF SEROMA FORMATION

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
SEROMA FORMATION	NO	25	93%	23	85%	48	1.283	0.526
	YES	2	7%	4	15%	6		
Total		27	100%	27	100%	54		

In this study, out of 27 patients who underwent TAPP, 7% (n=2) patients had seroma formation and in the other 27 patients who underwent TEP, 15% (n=4) cases had seroma formation. Seroma formation was slightly more in patients who underwent TEP than the TAPP group.

P value was 0.526 and was not significant.

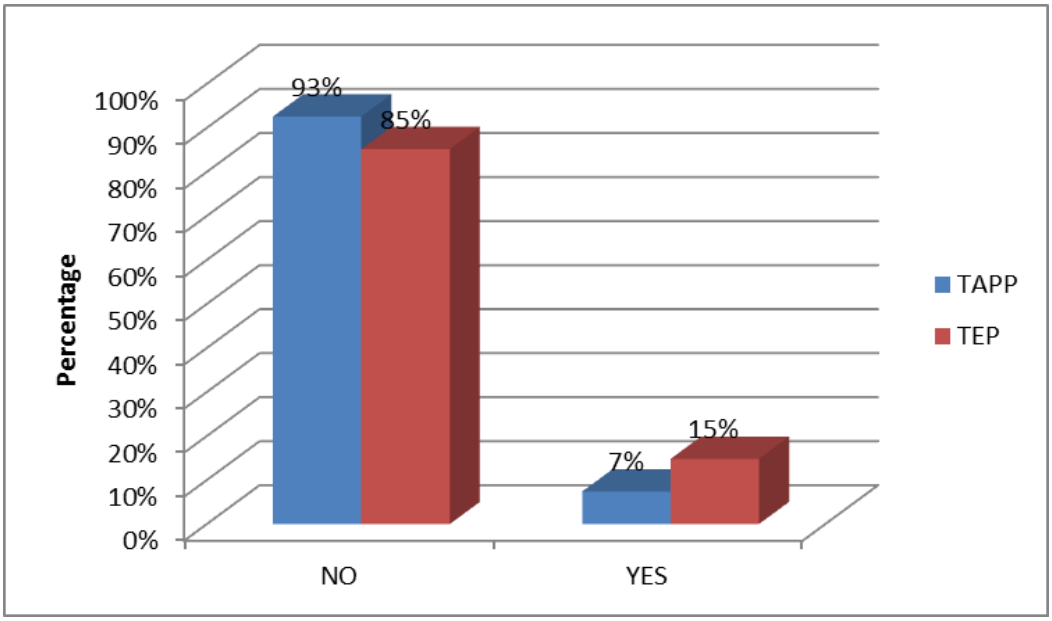


FIGURE 22- DISTIBUTION OF PATIENTS ON THE BASIS OF SEROMA FORMATION

TABLE 25- DISTIBUTION OF PATIENTS ON THE BASIS OF WOUND INFECTION

		Surgery				Total	Chi-square value	p-value
		TAPP	TAPP	TEP	TEP			
WOUND INFECTION	NO	25	93%	26	96%	51	0.353	0.552
	YES	2	7%	1	4%	3		
Total		27	100%	27	100%	54		

In this study, out of 27 patients who underwent TAPP, 7% (n=2) patients had superficial soft tissue infection at the port site and in the other 27 patients who underwent TEP 4% (n=1) case had superficial soft tissue infection at the port site. P value was 0.552 and was not significant.

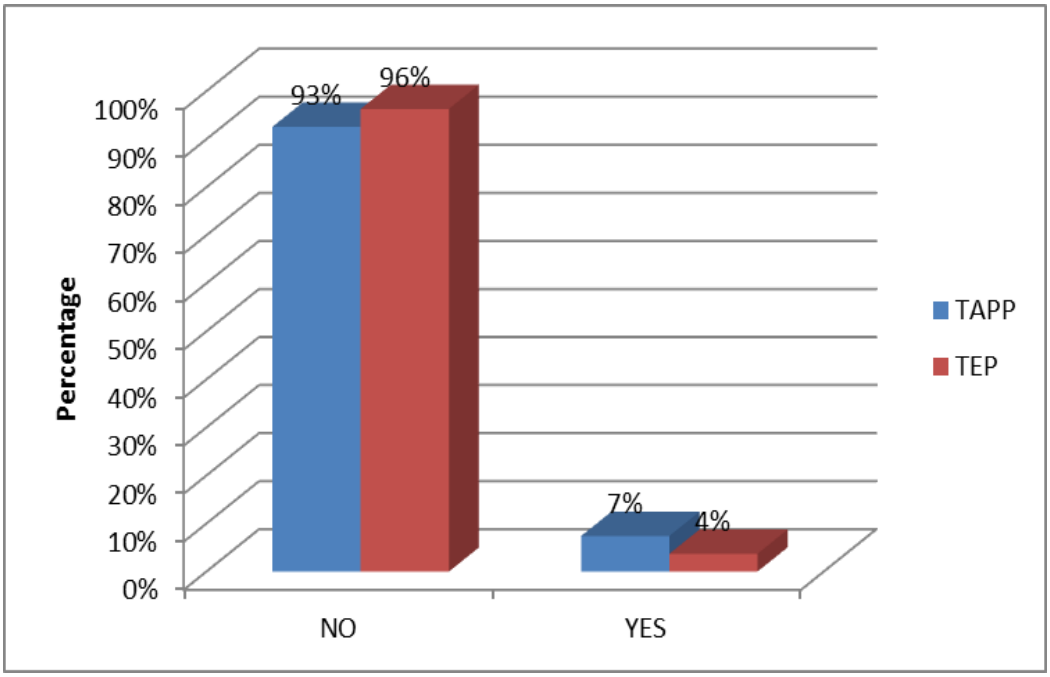


FIGURE 23- DISTIBUTION OF PATIENTS ON THE BASIS OF WOUND INFECTION

TABLE 26- DISTRIBUTION OF PATIENT ON THE BASIS OF LENGTH OF HOSPITAL STAY

	TAPP		TEP		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD			Lower	Upper
LENGTH OF HOSPITAL STAY IN HRS	41.56	3.82	38.52	3.70	2.967	0.005	0.98	5.09

In our study, in the TAPP group, the mean duration of post-operative stay was 41.56 hours with a SD of 3.82 . In the TEP group, the mean duration of post-operative hospital stay was 38.52 hours with a SD of 3.70.
The difference of hospital stay was significantly higher in the TAPP group than the TEP group (p value= 0.005)

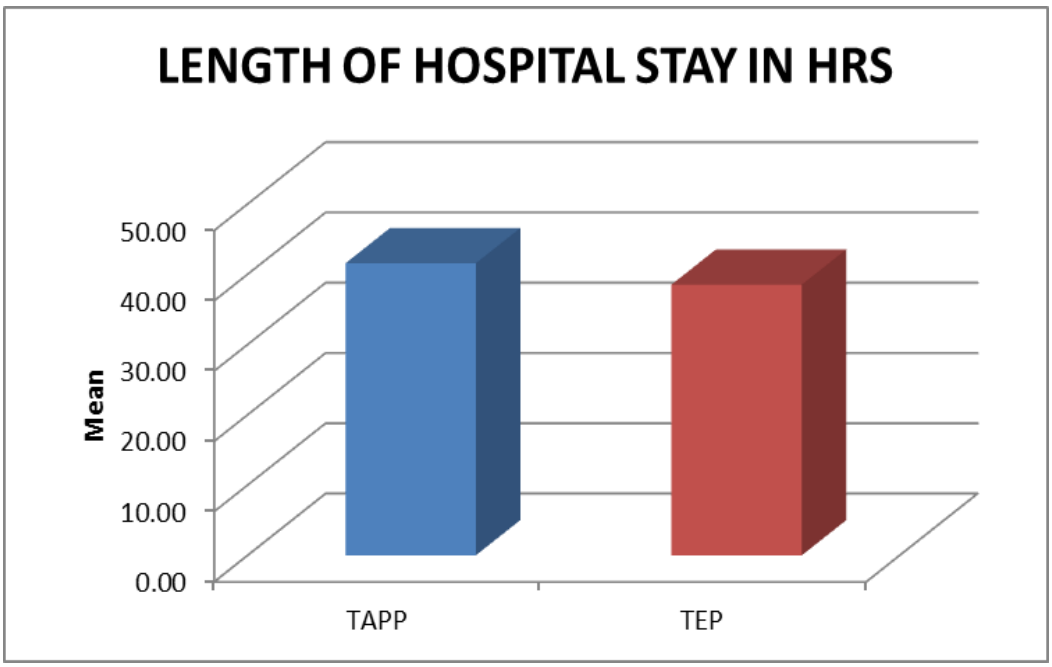


FIGURE 24- DISTRIBUTION OF PATIENTS ON THE BASIS OF LENGTH OF HOSPITAL STAY

TABLE 27- DISTRIBUTION OF PATIENT ON THE BASIS RECURRENCES OF HERNIA

		Surgery				Total
		TAPP		TEP		
RECURRENCE OF HERNIA AT_7 days	NO	27	100%	27	100%	54
Total		27	100%	27	100%	54

		Surgery				Total
		TAPP		TEP		
RECURRENCE OF HERNIA AT_1 month	NO	27	100%	27	100%	54
Total		27	100%	27	100%	54

		Surgery				Total
		TAPP		TEP		
RECURRENCE OF HERNIA AT_3 months	NO	27	100%	27	100%	54
Total		27	100%	27	100%	54

In this study, patients were evaluated for any recurrence of hernia at 7 days, 1 month and 3 months duration. There were no recurrence in any patient in either group as per clinical examination.

TABLE 28- DISTRIBUTION OF PATIENT ON THE BASIS OF ANY CHRONIC PAIN AT 3 MONTHS OF FOLLOW UP –

		Surgery				Total	Chi-square value	p-value
			TAPP		TEP			
Complaint of pain at 3 months	YES	2	7%	1	4%	3	0.353	0.552
	NO	25	93%	26	96%	51		
Total		27	100%	27	100%	54		

In our study, patients were followed up for 3 months and any complaint of pain at surgical site was inquired. In the TAPP group out of the 27 patients, n=2 (7%) patients had complain of chronic persistent mild pain at the surgical site.

In the TEP group, out of the 27 patients, n=1 (4%) patient had complaint of chronic pain at the surgical site. The difference was statistically insignificant with p-value of 0.552.

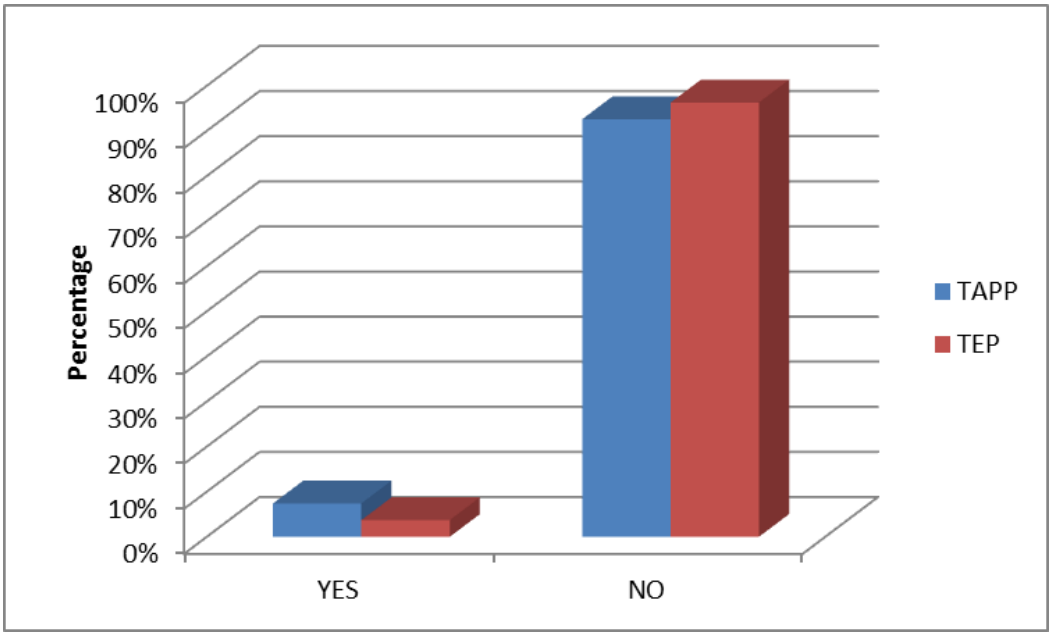


FIGURE 25 - DISTRIBUTION OF PATIENT ON THE BASIS OF ANY CHRONIC PAIN AT 3 MONTHS OF FOLLOW UP

DISCUSSION

Inguinal hernia repair is the most common performed surgery. Open mesh repair (Lichtenstein) has been the standard of care for a long time until laparoscopic techniques for repair of inguinal hernias came. There are two standard laparoscopic techniques for inguinal hernia repair, i.e., transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) repair. Indirect comparisons between TAPP and TEP have raised questions, whether the two procedures have different outcomes with respect to intra operative complications, postoperative pain, post operative complications, recurrence. There is a scarcity of data for comparing the two techniques, and questions still remain about the relative merits and risks of the two techniques. The present prospective randomized study aimed to compare TAPP and TEP directly in order to determine which method is associated with better outcomes.

The essential difference between TAPP and TEP is the route of access to the pre-peritoneal space. Outcome of intra-operative injury, need for conversion to other repair technique, operative time were evaluated. The incidence of wound related complications, chronic pain and recurrences were evaluated. Here we discuss the results of our study evaluating TAPP and TEP procedure in inguinal hernias where a comparative evaluation was done addressing the above issues.

In this study, 54 patients were included who underwent laparoscopic inguinal hernia repair. Out of this, 27 patients underwent TAPP repair and the other 27 patients underwent TEP repair with the standard technique of hernia repair.

All the patients included were male patients. The mean age of patients in the TAPP group was 40.04 and the TEP group was 39.00 years.

Patients included in the two groups were comparable in terms of duration of onset of symptoms, reducibility of contents, impulse on coughing, any

previous history of chronic cough, constipation, H/O comorbidities like diabetes, hypertension.

The two groups were also comparable in terms of number of unilateral and bilateral cases, type of hernia, i.e., direct or indirect, the contents of the hernia sac, and whether complete or incomplete hernia sac.

We compared the occurrence of **intra-operative injury** to the spermatic cord, blood vessel, nerve and viscera in the two groups. In both the groups, there was no intra operative injury to any major blood vessel or spermatic cord or to bowel. Previous studies have reported an intraoperative bowel injury rate of 0–0.06% in laparoscopic hernia repair.[84,89]

Two separate studies reported no visceral injuries.[90,91] Krishna A et al.[59] reported no bowel, major vascular, or bladder injuries in there study .

Duration of surgery was calculated as time from the first skin incision till closure of last port skin incision. Duration of surgery was calculated separately for unilateral and bilateral hernias.

Mean duration of surgery in unilateral hernia cases in the TAPP group was 91.16 minutes and it was 84.97 minutes in the TEP group. The difference was statistically significant with the p-value of 0.003.

Mean duration of surgery in bilateral hernia cases in the TAPP group was 112.00 minutes and it was 103.61 minutes in the TEP group. The difference was statistically significant with the p-value of 0.031.

Previous studies reported similar results as ours [74,76] stating that TAPP has more operative duration then TEP. The reason for the longer operative time for TAPP in our study could be due to the time taken for suturing the peritoneum to cover the mesh. In case of bilateral hernias, this might be due to the fact that in TEP repair for bilateral hernia, the dissection is shifted from one side to the other at the same working plane, hence be of a shorter operating duration than TAPP, where a new fresh flap has to be created on both the sides. Also study by Krishna A et al.[59] reported more operative time with TAPP then TEP. Contradictory results

were found in the study by Sharma D et al.[60] where mean operating time was longer in TEP as compared to TAPP.

Gass M. et al. reported that the average duration of the operation was longer for patients undergoing TEP than for those with TAPP (66.6 vs. 59 min, respectively; p>0.001)

Bracale u. et al. reported that TEP is more time consuming than TAPP, but this difference was not significant. Similar results found in the review by Wake et al.

In our study, there was no **conversion** of any procedure to another surgical technique in either of the two groups. Bracale U. et al [74] found a higher number of conversions with TEP (1.57 %) compared with TAPP (0.75 %), consistent with the findings by Wake et al.[15]

In the study by Krishna A et al[59], there were no conversions to open repair in either group or TEP to TAPP conversion.

In the Post operative period, pain is the most common complaint. In our study pain scores calculated on a VAS at 8, 16, 24, 32, 40 and 48 hours were higher at all the levels in the TAPP group as compared to the TEP group. Pain was significantly higher in the TAPP group at 24 hours of measurement.

It was similar to the study by Krishna A et al.[59]**,** the pain score were statistically significantly higher in the TAPP group at 1 h (1.98 vs. 2.79) (p = 0.0001) and at 24 h after surgery (1.09 vs. 1.83) (p = 0.007). The significantly higher pain scores were reported up to 3 months (0.96 vs. 1.280) (p = 0.0001).

Sharma D et al. observed that pain scores was slightly less after TAPP then the TEP, though the difference could not achieve a statistical significance.

In the study by Bracale u. et al. they did not find a significant difference between both groups, with similar results in the reviews by Wake et al., Hamza et al.[92], Dedemadi et al. [93], and Gunal et al.[76]

We compared the study groups on the basis of **duration of injectable analgesics requirement** after surgery. The requirement of injectable analgesics was significantly higher in the TAPP group than the TEP group (p-value=0.007).

It is consistent with the higher pain scales in TAPP as compared with TEP. The two study groups were compared on the basis of post operative return of bowel function in hours. In our study, In the TAPP group, mean time for return of bowel function was 25.11 hour. In the TEP group, mean time for return of bowel function was 22.96 hours. Though the mean time for return of bowel function was more in TAPP than TEP, but the difference could not achieve statistical significance (p-value=0.076)

Various **post operative complications** like scrotal edema, seroma formation, surgical site infection were comparable between the two groups.

Scrotal edema occurred in 3 patients of TAPP and 2 patients of TEP group. Though scrotal edema occurred more in TAPP group but the difference was not statistically significant (p-value=0.639).

In the study conducted by Krishna A et al.[59], the incidence of scrotal edema was significantly higher in TAPP then TEP (p = 0.009).

Seroma formation occurred in 4 patients in the TEP group and 2 patients in the TAPP group. Though seroma formation was slightly more in patients who underwent TEP than TAPP group but P-value being 0.526, statistical difference was not significant. Indirect hernia, large defect with extension into scrotum and old age was associated with higher incidence of seroma formation.

As reported in the study by Mahesh C Misra et al, seroma is the most common complication after laparoscopic inguinal hernia repair [81] and can mimic postoperative recurrence. The incidence of seroma formation ranges from 1.9% to 11% after laparoscopic repair. However it can be as high as 41% during the initial few days.[81]

Seroma formation was 6.66% in TAPP and 14.28% in TEP in the study conducted by Sharma D et al.

Study by Krishna A. et al. suggested that the seroma formation rate was significantly higher in the TEP group (37.8% vs. 17.0%) (p = 0.021).

In the TAPP group 2 patients had superficial soft tissue infection at the port site and in the TEP group 1 case had superficial soft tissue infection at the port site. P-value being 0.552, was not significant.

Reported incidence of deep mesh infection varies between 0-0.2% in TAPP [92,93] and 0-0.02% in TEP [93,94] procedures. In the study conducted by Sharma D et al. two patients in the TAPP group and one in the TEP group had mild wound discharge which was comparable to our study.

Gass M. et al.[75] reported postoperative complication rates of below 5 % although they were much lower compared to reported in the Gong et al. study [97] (12.0 % for the TAPP group and 13.5 % for the TEP group)

The two groups were compared on the basis of post operative hospital stay in number of hours. In our study, in the TAPP group, the mean duration of post-operative stay was 41.56 hours. In the TEP group, the mean duration of post-operative hospital stay was 38.52 hours. The difference of hospital stay was significantly higher in the TAPP group than the TEP group (p value= 0.005).

In the study conducted by Bracale U. et al., they concluded that TEP is associated with a significantly shorter hospital stay than TAPP: -0.31 days (0.082–0.53; P<0.01).

In the study by Krishna A. et al. [59], in the TEP group, the postoperative stay was 24.4 ± 3.2 h and in the TAPP group, it was 25.2 ± 5.1 h. However, there was no statistically significant difference in hospital stay between the two groups (p = 0.056).

In the study conducted by Gass M. et al., Postoperative hospital stay was significantly longer for patients undergoing TAPP than for those with TEP (2.9 vs. 2.3 days, p = 0.002).

In our study, patients were followed up 7 days, 1 month and 3 months duration and any evidence of hernia recurrence was clinically checked. There was no case of hernia recurrence in the either group.

In the previous studies, the reported incidence of recurrence after TEP is around 1-2%, and after TAPP to be around 0-3%.[82,83]

In the study conducted by Krishna A et al[59] there were no recurrence in the immediate postoperative period and during follow-up ranging from 15 to 38 months.

In the study by Bracale U. et al., there was no difference in terms of recurrence between TAPP versus TEP. Dedemadi et al.[95] reported that they could not establish the exact recurrences rate because of small number of patients in each group. Heikkinen et al.[96] in there study reported that both TEP and TAPP have a low risk for hernia recurrence. Gunal et al. [76] found no significant differences between the two groups in terms of recurrence. The review by Wake et al.[15] reported no difference in terms of hernia recurrence

We followed up the patients at 3 months and inquired about any chronic pain at the surgical site. In the TAPP group, 2 patients had complained of chronic persistent mild pain at the surgical site.

In the TEP group, 1 patient had complained of chronic pain at the surgical site. The difference was statistically insignificant with p-value of 0.552.

SUMMARY AND CONCLUSION

The study was conducted in the Department of Surgery, Dayanand Medical College and Hospital, Ludhiana over a period of one year and three months. In our study, 54 patients underwent inguinal hernia repair with laparoscopic techniques. Out of this 27 patients underwent laparoscopic trans-abdominal pre peritoneal repair and other 27 patients underwent laparoscopic totally extra peritoneal repair of inguinal hernia.

The EHS guidelines recommended that an endoscopic approach is considered if quick postoperative recovery is desired. However, they did not specify which is the best laparoscopic approach for inguinal hernia repair, although (with grade D) the TEP approach for endoscopic inguinal hernia operation was recommended.[37]

The findings from the present study demonstrate that both the endoscopic hernia repair methods, TAPP and TEP, are safe, feasible, and associated with a low postoperative morbidity rate for the repair of primary uncomplicated unilateral and bilateral inguinal hernia.

There was no significant difference in the intraoperative complications between TEP and TAPP. No conversion to other surgical method or any injury to visceral structures noted in the either group. In terms of postoperative complications like seroma formation, scrotal edema and surgical site infection, the two groups were comparable.

TEP has significantly less mean operative time as compared to TAPP. Pain scores were significantly higher in TAPP as compared to TEP, most probably because of the peritoneal incision. Post-operative requirement of injectable analgesics was significantly higher in TAPP then TEP. Average duration of post-operative stay in the hospital was significantly higher in TAPP then TEP. Though there were no intra operative injuries in the present study but TEP is the safer procedure as the working space is extra-peritoneal and risk of injury to intra-peritoneal structures was less.

The lesser intraoperative duration of surgery with less post-operative pain scores and less post-operative hospital stay favours the use of Totally extra-peritoneal laparoscopic repair over the trans-abdominal pre-peritoneal repair of inguinal hernia.

However the surgical outcome in terms of intra operative complications, post-operative complication, hernia recurrence and chronic pain on follow up for the two endoscopic techniques is comparable and no technique is superior over the other in this respect.

LIMITATIONS OF THE STUDY

The main limitation of our study is small sample size and lack of long-term follow up and outcomes, including data on the incidence of hernia recurrence, long-term pain.

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SR NO	NAME	AGE	SEX	DOA	DOD	MRD NO	CHIEF COMPLAINTS	duration	REDUCIBILITY	ONSET OF PAIN	H/O OF PROLONGED COUGH/CONSTIPATION/URINARY SYMPTOM	PERSONAL HISTORY	PAST HISTORY	GENERAL EXAMINATION					
														HR	BP	RR	TEMP		INSPECTION
																		SWELLING	SKIN OVER THE SWELLING
1	PS	58	M	3/15/2019	3/16/2019	708721	PAIN RT GROIN REGION, SWELLING RT INGUINAL REGION	1 YEAR	REDUCIBLE	6 MONTH	NO	H.O. ALCOHOL ABUSE	H.O. HYPERTENSION AND DIABETES MELLITUS	90	130/70	20	AFEBRILE	RIGHT INGUINO SCROTAL SWELLING	SKIN OVER THE SWELLING NORMAL,NO REDNESS
2	VK	41	M	2/7/2019	2/9/2019	667325	SWELLING B/L GROIN REGION	4 DAYS	REDUCIBLE	4 DAYS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	82	120/80	18	AFEBRILE	SWELLING B/L GROIN REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS
3	AK	42	M	12/18/2018	12/20/2018	639745	SWELLING RT INGUINAL REGION	3 MONTH	REDUCIBLE	3 MONTHS	NO	H.O. SMOKING AND ALCOHOL ABUSE PRESENT	NO RELEVANT HISTORY	86	120/80	22	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS OR DISCOLOURATON SEEN
4	D	18	M	3/9/2019	3/15/2019	700593	SWELLING RT INGUINAL REGION	3 MONTHS	REDUCIBLE	3 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	89	130/80	16	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS , NO SCRATCH MARKS
5	PS	30	M	4/10/2018	4/13/2018	406545	SWELLING LEFT GROIN REGION	1 YEAR	REDUCIBLE	1 YEAR	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	76	110/70	18	AFEBRILE	SWELLING LEFT GROIN REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS,NO SCAR MARK
6	GS	38	M	3/16/2018	3/19/2018	230899	SWELLING RT GROIN WITH PAIN RT GROIN	1.5 MONTHS	REDUCIBLE	1 MONTH	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	96	110/70	20	AFEBRILE	SWELLING RT INGUINOSCROTAL REGION	SKIN OVER THE SWELLING IS NORMAL
7	MS	24	M	3/26/2018	3/29/2018	462156	SWELLING WITH PAIN B/L INGUINAL REGION	2 MONTHS	REDUCIBLE	2 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	98	120/60	16	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS ,NO SCAR MARK
8	GS	31	M	8/2/2018	8/4/2018	552271	SWELLING RT INGUINAL REGION	5 MONTHS	NON REDUCIBLE	5 MONTHS	NO	H/O ALCOHAL ABUSE PRESENT	NO RELEVANT HISTORY	80	110/70	16	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
9	TS	32	M	9/18/2018	9/20/2018	584057	SWELLING B/L INGUINAL REGION	1 YEAR	REDUCIBLE	3 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	88	120/80	20	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
10	SS	59	M	3/15/2019	3/17/2019	493509	RT INGUINAL SWELLING WITH PAIN RT GROIN	6 MONTHS	REDUCIBLE	6 MONTHS	H/O URINARY RETENTION WITH THIN STREAM OF URINE	NO RELEVANT HISTORY	H/O HYPERTENTION PRESENT	78	130/90	14	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
11	AKA	50	M	7/5/2018	7/8/2018	532830	PAIN AND SWELLING LEFT INGUINAL REGION	20 DAYS	REDUCIBLE	20 DAYS	H/O CHRONIC COUGH PRESENT	H/O DIABETES PRESENT	NO RELEVANT HISTORY	92	140/90	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
12	AS	22	M	12/17/2018	12/21/2018	635049	RT INGUINAL SWELLING WITH PAIN RT GROIN	1 MONTH	REDUCIBLE	1 MONTH	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	74	130/80	20	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLIMG IS NORMAL
13	JP	56	M	2/17/2019	2/19/2019	709968	SWELLING B/L INGUINAL REGION	18 MONTH	REDUCIBLE	2 MONTHS	NO	H/O SMOKING PRESENT	NO RELEVANT HISTORY	79	120/70	18	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
14	PS	33	M	1/23/2018	1/25/2018	426574	LEFT INGUINAL SWELLING	2 MONTHS	REDUCIBLE	NO	NO	H/O ALCOHAL ABUSE PRESENT	NO RELEVANT HISTORY	60	140/90	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO SCAR MARK
15	RS	27	M	8/5/2018	8/7/2018	553930	SWELLING LEFT INGUINAL REGION WITH PAIN	5 DAYS	REDUCIBLE	5 DAYS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	92	130/7O	22	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
16	TR	64	M	6/12/2018	6/16/2018	518079	SWELLING RT INGUINAL REGION WITH PAIN	8 MONTHS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	H/O HYPERTENSION AND CVA IN PAST	88	120/80	20	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
17	AK	42	M	12/18/2018	12/20/2018	639745	SWELLING RT INGUINAL REGION	3 MONTHS	REDUCIBLE	NO	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	76	110/70	17	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
18	RP	70	M	3/9/2019	3/12/2019	61720	SWELLING B/L INGUINAL REGION	2 YRS	REDUCIBLE	6 MONTH	H/O BRONCHIAL ASTHMA WITH COUGH	H/O SMOKING PRESENT	H/O DIABETES , POST PTCA 2015, ASTHMA	80	130/70	20	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
19	DK	40	M	2/17/2019	2/20/2019	710813	SWELLING LEFT INGUINAL REGION WITH PAIN	10 MONTHS	REDUCIBLE	6 MONTHS	H/O COUGH PRESENT	H/O SMOKING PRESENT	BRONCHIAL ASTHMA	90	110/70	18	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
20	MA	19	M	1/15/2019	1/17/2019	707958	LEFT INGUINAL SWELLING AND PAIN	2 MONTHS	REDUCIBLE	2 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	89	120/70	16	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
21	RS	24	M	8/18/2018	8/21/2018	562739	SWELLING RT INGUINAL REGION WITH PAIN	8 MONTHS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	92	130/60	18	AFEBRILE	SWELLING RT INGUINO SCROTAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS,NO SCAR MARK
22	RK	43	M	18-Oct	10/20/2018	553963	RT INGUINAL SWELLING WITH PAIN RT GROIN	1 MONTH	REDUCIBLE	1 MONTH	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	99	120/70	20	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
23	GS	38	M	3/16/2018	3/19/2018	459610	SWELLING RT INGUINAL REGION WITH DRAGGING PAIN	1.5 MONTHS	REDUCIBLE	1.5 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	140/70	18	AFEBRILE	SWELLING RT INGUINO SCROTAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO SCAR MARK,NO REDNESS
24	R	59	M	3/5/2019	3/8/2019	622209	SWELLING RT INGUINAL REGION	4 MONTHS	REDUCIBLE	NIL	NO	NO RELEVANT HISTORY	H/O HYPOTHYROIDISM	84	120/80	20	AFEBRILE	SWELLING RT INGUINAL REGION , SELF REDUCIBLE	SKIN OVER THE SWELLING IS NORMAL,NO SCAR MARK,NO REDNESS
25	LS	65	M	2/21/2019	2/23/2019	559908	SWELLING RT INGUINAL REGION WITH DRAGGING PAIN	3 YRS	REDUCIBLE	3 YRS	NO	H/O ALCOHAL ABUSE PRESENT	NO RELEVANT HISTORY	75	130/70	20	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS
26	JS	26	M	3/2/2018	3/5/2018	299476	SWELLING RT INGUINO SCROTAL REGION	4 MONTHS	NON REDUCIBLE	4 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	74	140/90	18	AFEBRILE	SWELLING RT INGUINO SCROTAL REGION	SKIN OVER THE SWELLING IS NORMAL AND NO REDNESS
27	MS	32	M	3/22/2018	3/25/2018	620312	SWELLING LEFT INGUINAL REGION WITH PAIN	4-5 YRS	REDUCIBLE	NO	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	88	110/70	16	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS

SR NO	NAME	AGE	SEX	DOA	DOD	MRD NO	CHIEF COMPLAINTS	duration	REDUCIBILITY	ONSET OF PAIN	H/O OF PROLONGED COUGH/CONSTIPATION/URINARY SYMPTOM	PERSONAL HISTORY	PAST HISTORY	GENERAL EXAMINATION					
														HR	BP	RR	TEMP		INSPECTION
																		SWELLING	SKIN OVER THE SWELLING
28	GKS	20	M	5/2/2018	5/6/2018	274498	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	2 MONTHS	REDUCIBLE	2 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	84	110/70	18	AFEBRILE	SWELLING RT INGUINAL REGION UPTO SUPERFICIAL RING	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS
29	N	18	M	1/8/2019	1/11/2019	649952	SWELLING LEFT INGUINAL REGION WITH PAIN	3 WEEKS	REDUCIBLE	3 WEEKS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	80	120/70	17	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL
30	TS	62	M	12/31/2018	1/3/2019	643793	SWELLING RT INGUINAL REGION WITH SWELLING LEFT INGUINAL REGION	15 DAYS	REDUCIBLE	15 DAYS	NO	H/O ALCOHAL ABUSE PRESENT	NO RELEVANT HISTORY	96	130/70	16	AFEBRILE	SWELLING RT AND LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS
31	SK	65	M	9/3/2018	9/6/2018	573750	SWELLING LEFT INGUINAL REGION WITH PAIN	1 WEEK	REDUCIBLE	1 WEEK	NO	H/O SMOKING AND ALCOHOL ABUSE PRESENT	H/O HYPERTENSION AND CVA IN PAST	88	140/80	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLING IS NORMAL,NO REDNESS ,NO SCAR MARK
32	RN	50	M	10/8/2018	10/11/2018	595476	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	20 DAYS	REDUCIBLE	20 DAYS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	96	130/90	16	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
33	HS	40	M	7/6/2018	7/7/2018	483905	SWELLING B/L INGUINAL REGION	5 MONTHS	REDUCIBLE	NO	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	84	140/80	20	AFEBRILE	SWELLING RT AND LEFT INGUINAL REGION PRESENT	SKIN OVER THE SWELLLING IS NORMAL
34	RK	53	M	12/27/2018	12/29/2018	288460	SWELLING B/L INGUINAL REGION	1 YEAR	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	76	130/80	21	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
35	DS	26	M	10/16/2018	10/20/2018	600986	SWELLING LEFT INGUINOSCROTAL REGION WITH SWELLING RT INGUINAL REGION	2 YRS	NON REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	84	120/80	18	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
36	SK	62	M	11/25/2018	11/27/2018	625946	RT INGUINAL SWELLING WITH PAIN RT GROIN	1.5 YRS	REDUCIBLE	1 YEAR	NO	NO RELEVANT HISTORY	H/O HYPERTENSION PRESENT	88	140/90	16	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
37	AB	28	M	12/27/2018	12/28/2018	622220	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	2 MONTHS	NON REDUCIBLE	2 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	84	120/80	18	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
38	RP	63	M	4/22/2018	4/24/2018	613343	SWELLING LEFT INGUINAL REGION WITH PAIN	2 MONTHS	REDUCIBLE	NO	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	74	130/80	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
39	S	24	M	1/19/2019	1/21/2019	711275	SWELLING RT INGUINAL REGION	10 DAYS	REDUCIBLE	10 DAYS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	140/80	18	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
40	NK	22	M	3/7/2019	3/10/2019	704276	SWELLING LEFT INGUINAL REGION WITH PAIN	2 YRS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	82	140/80	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
41	JK	50	M	10/3/2018	10/5/2018	593204	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	3 MONTHS	REDUCIBLE	3 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	138/90	18	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
42	SKJ	57	M	10/17/2018	10/19/2018	598018	SWELLING B/L INGUINAL REGION	1 YR	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	H/O HYPERTENSION AND DIABETES PRESENT	85	140/90	16	AFEBRILE	SWELLING B/L INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
43	AS	33	M	11/30/2018	12/2/2018	628977	SWELLING LEFT INGUINAL REGION WITH PAIN	3 MONTHS	REDUCIBLE	2 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	130/80	14	AFEBRILE	SWELLING LEFT INGUINAL REGION 3X2 CMS	SKIN OVER THE SWELLLING IS NORMAL
44	PS	28	M	12/8/2018	12/11/2018	633623	RT INGUINAL SWELLING WITH PAIN RT GROIN	2 YRS	REDUCIBLE	2 YRS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	84	120/80	18	AFEBRILE	RT SIDED INGUINO-SCROTAL SWELLING	SKIN OVER THE SWELLLING IS NORMAL
45	AN	25	M	12/1/2018	12/3/2018	629594	RT INGUINAL SWELLING WITH PAIN RT GROIN	5 MONTHS	REDUCIBLE	5 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	88	120/80	20	AFEBRILE	RT INGUINAL SWELLING 4X2 CMS	SKIN OVER THE SWELLLING IS NORMAL
46	RS	45	M	12/3/2018	12/6/2018	666770	SWELLING B/L INGUINAL REGION	2 YRS	REDUCIBLE	6 MONTHS	H/O COUGH PRESENT	H/O SMOKING AND ALCOHOL ABUSE PRESENT	H/O HYPERTENSION AND COPD	94	140/90	22	AFEBRILE	SWELLING LEFT INGUINAL REGION WITH RT INGUINAL SWELLING	SKIN OVER THE SWELLLING IS NORMAL
47	RB	40	M	1/18/2019	1/21/2019	655341	SWELLING LEFT INGUINAL REGION WITH PAIN LEFT GROIN	3 YFS	REDUCIBLE	1 YR	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	130/80	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
48	IS	33	M	4/2/2018	4/4/2018	465312	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	8 MONTHS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	85	130/90	18	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
49	D	29	M	8/21/2018	8/23/2018	547220	SWELLING LEFT INGUINAL REGION WITH PAIN LEFT GROIN	6 MONTHS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	78	120/80	16	AFEBRILE	SWELLING LEFT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
50	P	50	M	1/28/2019	1/31/2019	660394	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	1 YR	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	H/O HYPERTENSION	85	140/90	19	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVER THE SWELLLING IS NORMAL
51	SS	21	M	4/7/2018	4/9/2018	229719	SWELLING RT INGUINAL REGION WITH PAIN LEFT INGUINAL REGION	1 MONTH	REDUCIBLE	1 MONTH	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	88	120/80	22	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN NORMAL OVERLYING SWELLING
52	N	36	M	8/29/2018	9/1/2019	561357	SWELLING LEFT INGUINAL REGION WITH DRAGGING PAIN LEFT GROIN	4 MONTHS	REDUCIBLE	3 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	86	130/80	20	AFEBRILE	SWELLING LEFT INGUINAL REGION	OVERLYING SKIN IS NORMAL
53	NJ	45	M	6/27/2018	6/29/2018	417752	SWELLING RT INGUINAL REGION WITH PAIN RT GROIN	2 YRS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	92	140/80	22	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN OVERLYING THE SWELLING IS NORMAL
54	GG	26	M	8/3/2018	8/6/2018	552309	SWELLING RT INGUINAL REGION WITH OCCASIONAL PAIN	3 YRS	REDUCIBLE	6 MONTHS	NO	NO RELEVANT HISTORY	NO RELEVANT HISTORY	88	130/80	20	AFEBRILE	SWELLING RT INGUINAL REGION	SKIN NORMAL OVERLYING SWELLING

SR NO	NAME	AGE	LOCAL EXAMINATION						INVESTIGATION							Intraoperative data					
			PALPATION					PERCUSSION	HB	TLC	PLATELET COUNT	Na/K/Cl	UREA / CREATININE	RBS	PTI-INR	SURGERY	UNILATERAL OR BILATERAL	TYPE OF HERNIA	DURATION OF SURGERY(MIN)	INTRAOPERATIVE FINDING	EXTENT
			IMPULSE ON COUGHING	POSITION AND EXTENT	CONSISTENCY	IMPULSE ON COUGHING	IS THE SWELLING REDUCIBLE														
1	PS	58	PRESENT	SWELLING RT INGUINO SCROTAL REGION 6X 4CM	DOUGHY	PRESENT	YES	DULL	15.1	10.9	217	137/4.0/102	19/0.74	115	12.3-1.1	TAPP RIGHT INGUINAL HERNIA REPAIR	U	DIRECT	88	DIRECT HERNIAL SAC WITH OMENTUM AS CONTENT	COMPLETE
2	VK	41	PRESENT	SWELLING EXTENDING UPTO SUPERFICIAL INGUINAL RING	DOUGHY	PRESENT	YES	DULL	9.7	6.8	311	139/4/105	21/0.58	151	11.6-0.9	B/L TEP INGUINAL HERNIA REPAIR	B	DIRECT	102	B/L DIRECT HERNIAL SAC WITH OMENTUM AS CONTENT	INCOMPLETE
3	AK	42	PRESENT	SWELLING RT INGUINAL REGION 3X2 CM	DOUGHY	PRESENT	YES	DULL	11.8	11	126	138/3.5/96	44/1.0	134	13.1-1.2	TEP RT INGUINAL HERNIA REPAIR	U	INDIRECT	84	INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
4	D	18	PRESENT	SWELLING RT INGUINAL REGION 3X3 CM INTO THE INGUINAL CANAL	DOUGHY	PRESENT	YES	DULL	11.7	11	210	134/3.6/90	18/0.53	210	14-1.4	TAPP RIGHT INGUINAL HERNIA REPAIR	U	INDIRECT	92.5	INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
5	PS	30	PRESENT	SWELLING LEFT INGUINO SCROTAL REGION 5X 3 CM IN SIZE	SOFT	PRESENT	YES	RESONANT	12.5	13.3	138	139/3.5/94	28/1.56	138	12-1.0	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	86	INDIRECT INGUINAL HERNIA WITH SIGMOID COLON AND EPIPLOCAE AS CONTENT	COMPLETE
6	GS	38	PRESENT	SWELLING RT INGUINO SCROTAL REGION 4/3 CM	SOFT	PRESENT	YES	RESONANT	11.6	9	269	139/3.8/105	32/0.65	115	10.5-0.97	RT TEP INGUINAL HERNIA REPAIR	U	DIRECT	80.5	RT DIRECT INGUINAL HERNIA WITH SMALL GUT AS CONTENT	COMPLETE
7	MS	24	PRESENT	SWELLING B/L INGUINAL REGION EXTENDING INTO INGUINAL CANAL	DOUGHY	PRESENT	YES	DULL	15.4	8.5	348	139/4.8/104	27/0.81	118	10.3-0.95	B/L TAPP INGUINAL HERNIA REPAIR	B	INDIRECT	110	B/L INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
8	GS	31	PRESENT	SWELLING APPROX 4X2 CM EXTENDING INTO INGUINAL REGION	DOUGHY	PRESENT	NO	DULL	13.3	9.6	341	141/4.3/102	17/1.1	200	1.8-0.9	TAPP RIGHT INGUINAL HERNIA REPAIR	U	INDIRECT	94.5	RT INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
9	TS	32	PRESENT	SWELLING B/L INGUINAL REGION EXTENDING TILL SUPERFICIAL RING	DOUGHY	PRESENT	YES	DULL	14.1	6.3	152	139/4.18/104	30/0.75	185	11.7-1.0	B/L TEP INGUINAL HERNIA REPAIR	B	INDIRECT	99	B/L INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
10	SS	59	PRESENT	SWELLING RT INGUINAL REGION EXTENDING TILL SCROTUM	DOUGHY	PRESENT	YES	DULL	13.2	8.2	113	147/4.2/106	32/1.6	197	11.2-1.03	TEP RT INGUINAL HERNIA REPAIR	U	DIRECT	78.5	RT DIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	COMPLETE
11	AKA	50	PRESENT	SWELLING RT INGUINAL REGION 3X 2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	11.8	11.1	140	140/4.3/101	33/0.6	215	11.8-1.04	TAPP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	94.5	LEFT INDIRECT HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
12	AS	22	PRESENT	SWELLING RT INGUINAL REGION ABOUT 2X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.1	7.2	121	143/4.4/104	32/0.93	230	10.9-0.92	TEP RT INGUINAL HERNIA REPAIR	U	INDIRECT	82	RT INDIRECT INCOMPLETE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
13	JP	56	PRESENT	SWELLING B/L INGUINAL REGION	DOUGHY	PRESENT	YES	DULL	12.1	6.6	211	133/3.9//101	24/0.95	196	13.2-1.2	TAPP B/L INGUINAL HERNIA	B	DIRECT	118	B/L DIRECT INCOMPLETE UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
14	PS	33	PRESENT	SWELLING LEFT INGUINAL REGION 5 X 3 CM	DOUGHY	PRESENT	YES	DULL	12.6	11.8	265	142/4.97/102	19/0.8	187	14-1.5	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	78	LEFT REDUCIBLE INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
15	RS	27	PRESENT	SWELLING LEFT INGUINAL REGION 2X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	13.1	8	243	140/4.2/100	38/0.8	210	11.1-1.8	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	88	LEFT INDIRECT HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
16	TR	64	PRESENT	SWELLING RT INGUINAL REGION 5X4 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	12.2	10.1	104	137/4.2/103	40/0.9	190	11.1-1.2	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	89.5	RT INDIRECT UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
17	AK	42	PRESENT	SWELLING RT INGUINAL REGION 6X3 CMS	DOUGHY	PRESENT	YES	DULL	10.4	7.6	126	137/3.6/109	26/0.9	240	11.1-0.9	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	82	RT SIDED INDIRECT INCOMPLETE UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
18	RP	70	PRESENT	RT SIDE INGUINAL SWELLING WITH LEFT SIDED 2X2 SWELLING	DOUGHY	PRESENT	YES	DULL	10.8	10.9	109	138/3.9/101	26/0.8	155	10.9-0.7	B/L TEP INGUINAL HERNIA REPAIR	B	DIRECT	102	B/L DIRECT HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
19	DK	40	PRESENT	SWELLING LEFT INGUINO SCROTAL REGION 5X 3 CM IN SIZE	SOFT	PRESENT	YES	RESONANT	7.8	13.5	506	137/4.5/104	34/1.06	140	13.7-1.2	TAPP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	84	LEFT INDIRECT INCOMPLETE REDUCIBLE INGUINAL HERNIA WITH SMALL BOWEL AS CONTENT	COMPLETE
20	MA	19	PRESENT	SWELLING LEFT INGUINAL REGION 2X2 CMS	DOUGHY	PRESENT	YES	DULL	11.4	9.2	120	142/3.9/102	29/1.24	175	11.4-1.05	B/L TEP INGUINAL HERNIA REPAIR	B	INDIRECT	99	LEFT INDIRECT HERNIA WITH OMENTUM AS CONTENT WITH RT SIDED INCIPIENT HERNIA	INCOMPLETE
21	RS	24	PRESENT	SWELLING APPROX 6X4 CMS IN RT INGUINOSCROTAL REGION	DOUGHY	PRESENT	YES	DULL	12	7	180	141/4.1/102	22/0.73	170	11.2-1.2	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	102	RT INDIRECT UNCOMPLICATED REDUCIBLE INGUINAL HERNIA WITH OMENTUM AS CONTENT	COMPLETE
22	RK	43	PRESENT	SWELLING RT INGUINAL REGION 3X2 CMS BULGE	DOUGHY	PRESENT	YES	DULL	11.6	5	145	136/3.2/104	30/0.9	186	12-1.0	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	96	RT INDIRECT UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
23	GS	38	PRESENT	SWELLING APPROX 6X3 CMS EXTENDING TO SCROTUM	SOFT	PRESENT	YES	RESONANT	12.7	8.9	184	139/4.5/97	42/1.3	210	11.5-1.05	TEP RT INGUINAL HERNIA REPAIR	U	DIRECT	96.5	RT DIRECT INGUINAL HERNIA WITH SMALL GUT AS CONTENT	COMPLETE
24	R	59	PRESENT	SWELLING APPROX 4X3 CM IN RT INGUINAL REGION	DOUGHY	PRESENT	YES	DULL	10.5	7	298	136-4.9/102	35/1.03	170	13.4-1.3	TEP RT INGUINAL HERNIA REPAIR	U	INDIRECT	87.5	INDIRECT RT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
25	LS	65	PRESENT	SWELLING RT INGUINAL REGION APPROX 4X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	7.5	11.6	731	133/5.3/102	29/1.03	150	11.4-1.1	TAPP RT INGUINAL HERNIA REPAIR	U	DIRECT	92	RT DIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
26	JS	26	PRESENT	SWEELING RT INGUINAL REGION EXTENDING TO SCROTUM	SOFT	PRESENT	NO	RESONANT	14.7	7.6	252	136/4.3/96	21/0.9	132	12.9-1.2	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	98	RT INDIRECT COMPLETE UNCOMPLICATED INGUINAL HERNIA , WITH SMALL GUT AS CONTENT	COMPLETE
27	MS	32	PRESENT	SWELLING LEFT INGUINAL REGION 4X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	12.8	8.3	199	140/4.9/101	14/0.49	167	11.6-1.06	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	94	LEFT INDIRECT UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE

SR NO	NAME	AGE	LOCAL EXAMINATION						INVESTIGATION							Intraoperative data					
			PALPATION					PERCUSSION	HB	TLC	PLATELET COUNT	Na/K/Cl	UREA / CREATININE	RBS	PTI-INR	SURGERY	UNILATERAL OR BILATERAL	TYPE OF HERNIA	DURATION OF SURGERY(MIN)	INTRAOPERATIVE FINDING	EXTENT
			IMPULSE ON COUGHING	POSITION AND EXTENT	CONSISTENCY	IMPULSE ON COUGHING	IS THE SWELLING REDUCIBLE														
28	GKS	20	PRESENT	SWELLING RT INGUINAL REGION APPROX 4 X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	13.6	7.9	348	137/4.3/101	20/0.83	180	10.0-1.00	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	88	RT SIDED REDUCIBLE INDIRECT INGUINAL HERNIA WITH OMENUT AS CONTENT	INCOMPLETE
29	N	18	PRESENT	SWEELING LEFT INGUINAL REGION 3X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	8	7.2	233	140/4.9/104	30/1.07	163	11.4-1.05	B/L TEP INGUINAL HERNIA REPAIR	B	INDIRECT	112	B/L INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
30	TS	62	PRESENT	SWELLING 4X2 CMS IN RT INGUINAL REGION	DOUGHY	PRESENT	YES	DULL	11	7.2	286	133/3.7/4.0	40/0.89	170	12.0-1.0	B/L TAPP INGUINAL HERNIA REPAIR	B	INDIRECT	118	B/L INDIRECT INCOMPLETE HERNIAL SACS WITH OMENTUM AS CONTENT	INCOMPLETE
31	SK	65	PRESENT	SWELLING 3X2 CM IN LEFT INGUINAL REGION	DOUGHY	PRESENT	YES	DULL	10	8	208	134/4.5/101	40/1.2	131	13.0-1.5	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	98	LEFT SIDED INDIRECT INCOMPLETE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
32	RN	50	PRESENT	SWELLING RT INGUINAL REGION 3X3 CM INTO THE INGUINAL CANAL	DOUGHY	PRESENT	YES	DULL	11	8	201	135/3.7/102	23/0.8	146	11.1-1.02	TAPP RT INGUINAL HERNIA REPAIR	U	DIRECT	98	RT SIDED DIRECT INCOMPLETE UNCOMOPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
33	HS	40	PRESENT	SWELLING RT INGUINAL REGION 4X2 CM AND LEFT INGUINAL REGION 2X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	12.5	6.4	210	134/3.6/99	14/0.6	102	12.8-1.06	TAPP B/L INGUINAL HERNIA REPAIR	B	INDIRECT	110	B/L INDIRECT HERNIAL SAC WITH OMENTUM AS CONTENT	INCOMPLETE
34	RK	53	PRESENT	SWELLING RT INGUINAL REGION 5X2 CM AND LEFT INGUINAL REGION 3X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	14.5	8	186	140/4.0/100	20/0.8	98	14.0-1.1	B/L TEP INGUINAL HERNIA REPAIR	B	DIRECT	104	B/L DIRECT HERNIAL SAC WITH OMENTUM AS CONTENT	INCOMPLETE
35	DS	26	PRESENT	LEFT INGUINAL SWELLING 3X2 CM WITH RT SIDED INGUINAL SWELLING 4X2 CM SIZE	DOUGHY	PRESENT	NO	DULL	13.6	4.4	204	138/3.8/100	14/0.60	124	16.4-1.2	B/L TEP INGUINAL HERNIA REPAIR	B	INDIRECT	116	B/L INDIRECT HERNIAL SAC WITH OMENTUM AS CONTENT	INCOMPLETE
36	SK	62	PRESENT	RT INGUINAL SWELLING APPROX 4X3 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.8	6.2	284	144/4.0/102	34/0.9	115	10.2-0.9	RT TEP INGUINAL HERNIA REPAIR	U	DIRECT	90	RT SIDE DIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
37	AB	28	PRESENT	RT INGUINAL SWELLING ABOUT 3X2 CM IN SIZE	DOUGHY	PRESENT	NO	DULL	15.5	8.2	218	138/3.8/97	21/0.6	103	11.0-0.9	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	98	RT SIDE INDIRECT IRREDUCIBLE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
38	RP	63	PRESENT	LEFT INGUINOSCROTAL SWELLING APPROX 4X2 CM SIZE	DOUGHY	PRESENT	YES	DULL	13.8	6.4	245	143/4.2/99	16/0.8	96	11.9-1.01	TAPP LEFT INGUINAL HERNIA REPAIR	U	DIRECT	94	LEFT SIDE DIRECT HERNIAL SAC, REDUCIBLE WITH OMENTUM AS CONTENT	COMPLETE
39	S	24	PRESENT	RT INGUINAL SWELLING ABOUT 3X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.5	8.2	347	139/4.0/97	16/0.6	104	12.4-1.04	TEP RT INGUINAL HERNIA REPAIR	U	INDIRECT	88	RT INDIRECT INGUINAL HERNIA SAC WITH OMENTUM AS CONTENT	INCOMPLETE
40	NK	22	PRESENT	LEFT INGUINAL SWELLING APPROX 4X 2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	15	5.4	187	147/4.2/103	28/0.9	108	14.4-1.1	TAPP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	92	LEFT INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
41	JK	50	PRESENT	RT INGUINAL SWELLING APPROX 4X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	15.6	8.4	198	140/3.9/99	34/0.9	147	12.9-1.01	TEP RT INGUINAL HERNIA REPAIR	U	DIRECT	78	RT DIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
42	SKJ	57	PRESENT	RT INGUINAL SWELLING 5X2 CMS AND LEFT INGUINAL SWELLING 2X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	13.5	5.4	217	142/4.6/104	50/1.2	188	14.8-1.2	TAPP B/L INGUINAL HERNIA REPAIR	B	INDIRECT	104	RT AND LEFT INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
43	AS	33	PRESENT	SWELLING LEFT INGUINAL REGION 3X2 CMS	DOUGHY	PRESENT	YES	DULL	14.8	6.8	254	132/3.5/97	34/1.1	108	11.5-0.99	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	78	LEFT INDIRECT INCOMPLETE REDUCIBLE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
44	PS	28	PRESENT	RT SIDED INGUINOSCROTAL SWELLING APPROX 6X4 CM IN SIZE	SOFT	PRESENT	YES	RESONANT	15.5	7.4	198	142/3.99/103	23/0.6	118	12.2-1.12	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	84	RT INDIRECT HERNIA WITH SMALL BOWEL AS CONTENT , GUT HEALTHY	COMPLETE
45	AN	25	PRESENT	RT INGUINAL SWELLING APPROX 4X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	14.5	7.8	212	144/3.99/103	19/0.65	98	10.8-0.9	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	88	RT SIDED INDIRECT INCOMPLETE UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
46	RS	45	PRESENT	LEFT INGUINAL SWELLING 3X2 CM AND RT SMALL SWELLING INGUINAL AREA	DOUGHY	PRESENT	YES	DULL	13.6	4.8	258	139/4.0/101	25/0.78	142	11.8-1.0	TEP B/L INGUINAL HERNIA REPAIR	B	DIRECT	98	LEFT SIDE DIRECT HERNIA WITH OMETUM AS CONTENT , RT SIDE DIRECT HERNIA WITH OMENTUM	INCOMPLETE
47	RB	40	PRESENT	LEFT INGUINOSCROTAL SWELLING APPROX 5X3 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	14.8	7.4	184	140/3.8/102	28/0.80	112	12.1-1.08	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	86	LEFT INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	COMPLETE
48	IS	33	PRESENT	RIGHT INGUINAL SWELLING , 4X2 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	13.8	6.2	258	142/3.9/102	24/0.64	108	14.4-1.2	TAPP RT INGUINAL HERNIA REPAIR	U	INDIRECT	90.5	RT SIDED INDIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
49	D	29	PRESENT	LEFT INGUINAL SWELLING , 5X3 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.7	5.6	415	139/3.9/97	40/.90	95	14.2=1.1	TEP LEFT INGUINAL HERNIA REPAIR	U	INDIRECT	78.5	LEFT SIDED INDIRECT INCOMPLETE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
50	P	50	PRESENT	RT INGUINAL SWELLING , 4X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	13.6	6.9	315	145/4.2/101	36/0.85	102	12.5-1.08	TAPP RT INGUINAL HERNIA REPAIR	U	DIRECT	88.5	RT SIDED DIRECT INCOMPLETE UNCOMPLICATED INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
51	SS	21	PRESENT	RT INGUINAL SWELLING 3X2 CM IN SIZE	DOUGHY	PRESENT	YES	DULL	14.8	5.6	286	142/3.9/101	25/0.5	98	11.8-1.06	B/L TEP INGUINAL HERNIA REPAIR	B	INDIRECT	100.5	RT AND LEFT SIDED INDIRECT HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
52	N	36	PRESENT	LEFT INGUINAL REGION SWELLING APPROX 5X3 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.4	8.4	314	138/4.1/99	18/0.6	105	12.6-1.06	LEFT TAPP INGUINAL HERNIA REPAIR	U	INDIRECT	92	LEFT SIDED INDIRECT INCOMPLETE INGUINAL HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE
53	NJ	45	PRESENT	RT INGUINAL SCROTAL SWELLING APPROX 6X 4 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	15.6	7.8	188	142/4.1/101	24/0.8	114	14.8-1.2	TEP RT INGUINAL HERNIA REPAIR	U	DIRECT	78	RT SIDED DIRECT INGUINAL HERNIA WITH OMENTUM AS CONTENT	COMPLETE
54	GG	26	PRESENT	RT INGUINAL SWELLING 4X3 CMS IN SIZE	DOUGHY	PRESENT	YES	DULL	14.6	8.4	212	140/4.0/102	29/0.6	102	13.8-1.1	TEP RT INGUINAL HERNIA REPAIR	U	INDIRECT	79.5	RT SEDED INDIRECT HERNIA WITH OMENTUM AS CONTENT	INCOMPLETE

SR NO	NAME	AGE														POST OP- DATA								
					VAS score							Injectable requirement									RECURRENCE OF HERNIA AT			
			CONTENT	INTRA OPERATIVE INJURY	8 hours	16 hours	24 hours	32 hours	40 hours	48 hours	16-24 HRS	25-32 HRS	33-40 HRS	41-48 HRS	RETURN OF BOWEL FUNCTIONS IN HRS	WOUND INFECTION	SEROMA FORMATION	SCROTAL EDEMA	LENGTH OF HOSPITAL STAY IN HRS	7 days	1 month	3 months	C/O PAIN AT 3 MONTHS
1	PS	58	OMENTUM	NIL	6	5	4	2				30 HRS			24 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
2	VK	41	OMENTUM	NIL	6	4	3	2				28 HRS			24 HRS	NO	NO	NO	36 HRS	NO	NO	NO	NO
3	AK	42	OMENTUM	NIL	6	4	3	1				26 HRS			18 HRS	YES	NO	NO	36 HRS	NO	NO	NO	NO
4	D	18	OMENTUM	NIL	7	5	3	2	1			32 HRS			20 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
5	PS	30	INTESTINE	NIL	6	4	3	2			24 HRS				24 HRS	NO	YES	YES	38 HRS	NO	NO	NO	NO
6	GS	38	INTESTINE	NIL	6	5	3	2			24 HRS				24 HRS	NO	NO	NO	32 HRS	NO	NO	NO	NO
7	MS	24	OMENTUM	NIL	6	5	4	2				28 HRS			26 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
8	GS	31	OMENTUM	NIL	7	5	3	2	2			32 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	YES
9	TS	32	OMENTUM	NIL	6	4	3	2	1			32 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
10	SS	59	OMENTUM	NIL	6	5	3	2				26 HRS			24 HRS	NO	YES	NO	36 HRS	NO	NO	NO	NO
11	AKA	50	OMENTUM	NIL	6	4	2	2	1			30 HRS			24 HRS	YES	NO	NO	42 HRS	NO	NO	NO	NO
12	AS	22	OMENTUM	NIL	5	4	3	2	1			28 HRS			12 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
13	JP	56	OMENTUM	NIL	6	5	3	2	1			26 HRS			18 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
14	PS	33	OMENTUM	NIL	6	3	2	1				26 HRS			24 HRS	NO	NO	NO	32 HRS	NO	NO	NO	NO
15	RS	27	OMENTUM	NIL	6	4	3	2				28 HRS			24 HRS	NO	YES	NO	38 HRS	NO	NO	NO	NO
16	TR	64	OMENTUM	NIL	6	3	2	1			24 HRS				24 HRS	NO	NO	NO	36 HRS	NO	NO	NO	YES
17	AK	42	OMENTUM	NIL	7	5	3	2	1			26 HRS			24 HRS	NO	YES	YES	40 HRS	NO	NO	NO	NO
18	RP	70	OMENTUM	NIL	6	5	3	2	1			28 HRS			18 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
19	DK	40	INTESTINE	NIL	7	5	3	2	1				34 HRS		24 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
20	MA	19	OMENTUM	NIL	6	5	3	2				26 HRS			20 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
21	RS	24	OMENTUM	NIL	6	5	3	2	1			28 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
22	RK	43	OMENTUM	NIL	6	5	4	2	1			30 HRS			24 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
23	GS	38	INTESTINE	NIL	7	5	4	2	1			30 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	YES
24	R	59	OMENTUM	NIL	7	5	4	3	2	1			36 HRS		32 HRS	NO	NO	NO	48 HRS	NO	NO	NO	NO
25	LS	65	OMENTUM	NIL	6	4	3	2	2			32 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
26	JS	26	INTESTINE	NIL	7	5	4	3	2	1			34 HRS		30 HRS	NO	NO	NO	48 HRS	NO	NO	NO	NO
27	MS	32	OMENTUM	NIL	6	5	3	2	1			26 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO

SR NO	NAME	AGE														POST OP- DATA								
					VAS score							Injectable requirement									RECURRENCE OF HERNIA AT			
			CONTENT	INTRA OPERATIVE INJURY	8 hours	16 hours	24 hours	32 hours	40 hours	48 hours	16-24 HRS	25-32 HRS	33-40 HRS	41-48 HRS	RETURN OF BOWEL FUNCTIONS IN HRS	WOUND INFECTION	SEROMA FORMATION	SCROTAL EDEMA	LENGTH OF HOSPITAL STAY IN HRS	7 days	1 month	3 months	C/O PAIN AT 3 MONTHS
28	GKS	20	OMENTUM	NIL	6	5	3	2	1			30 HRS			26 HRS	YES	NO	NO	42 HRS	NO	NO	NO	NO
29	N	18	OMENTUM	NIL	7	5	3	2	2			28 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
30	TS	62	OMENTUM	NIL	7	6	5	4	2	1			36 HRS		36 HRS	NO	NO	NO	50 HRS	NO	NO	NO	NO
31	SK	65	OMENTUM	NIL	6	5	3	2	2			26 HRS			24 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
32	RN	50	OMENTUM	NIL	6	5	4	2	2			30 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
33	HS	40	OMENTUM	NIL	5	4	3	2	1		24 HRS				24 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
34	RK	53	OMENTUM	NIL	6	5	3	2				26 HRS			24 HRS	NO	NO	NO	36 HRS	NO	NO	NO	NO
35	DS	26	OMENTUM	NIL	7	6	5	3	2	1			36 HRS		32 HRS	NO	NO	NO	48 HRS	NO	NO	NO	NO
36	SK	62	OMENTUM	NIL	6	4	3	2				30 HRS			18 HRS	NO	NO	NO	36 HRS	NO	NO	NO	NO
37	AB	28	OMENTUM	NIL	7	6	4	3	2	1			36 HRS		40 HRS	NO	NO	NO	54 HRS	NO	NO	NO	NO
38	RP	63	OMENTUM	NIL	6	5	4	2	2			32 HRS			24 HRS	NO	NO	YES	44 HRS	NO	NO	NO	NO
39	S	24	OMENTUM	NIL	6	4	3	2				26 HRS			24 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
40	NK	22	OMENTUM	NIL	6	5	3	2	2			30 HRS			26 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
41	JK	50	OMENTUM	NIL	6	4	3	2	1		24 HRS				24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
42	SKJ	57	OMENTUM	NIL	7	6	4	3	2			32 HRS			28 HRS	NO	NO	NO	42 HRS	NO	NO	NO	NO
43	AS	33	OMENTUM	NIL	6	5	3	2				28 HRS			18 HRS	NO	NO	NO	36 HRS	NO	NO	NO	NO
44	PS	28	INTESTINE	NIL	7	5	4	2	2			30 HRS			20 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO
45	AN	25	OMENTUM	NIL	6	5	4	3	2			32 HRS			24 HRS	NO	NO	NO	44 HRS	NO	NO	NO	NO
46	RS	45	OMENTUM	NIL	6	5	3	2				32 HRS			20 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
47	RB	40	OMENTUM	NIL	6	5	4	2				28 HRS			24 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
48	IS	33	OMENTUM	NIL	6	5	4	3	2			28 HRS			18 HRS	NO	YES	NO	40 HRS	NO	NO	NO	NO
49	D	29	OMENTUM	NIL	6	4	3	2				26 HRS			24 HRS	NO	NO	NO	36 HRS	NO	NO	NO	NO
50	P	50	OMENTUM	NIL	7	6	4	2				30 HRS			24 HRS	NO	NO	NO	38 HRS	NO	NO	NO	NO
51	SS	21	OMENTUM	NIL	6	5	4	3	2			28 HRS			24 HRS	NO	NO	YES	40 HRS	NO	NO	NO	NO
52	N	36	OMENTUM	NIL	7	6	5	3	2			32 HRS			30 HRS	NO	NO	YES	40 HRS	NO	NO	NO	NO
53	NJ	45	OMENTUM	NIL	7	6	3	2				26 HRS			24 HRS	NO	YES	NO	36 HRS	NO	NO	NO	NO
54	GG	26	OMENTUM	NIL	6	5	4	3	2			28 HRS			24 HRS	NO	NO	NO	40 HRS	NO	NO	NO	NO

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No. BFUHS/2K18p-TH/ 15727 **Date**_____

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 31.08.2018 has approved the plan of thesis of Sahil Garg, a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Laparoscopic inguinal hernia repair-transabdominal preperitoneal (tapp) versus totally extraperitoneal (tep) approach

Supervisor
Dr. Sanjeev K. Singla
Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

Co-Supervisor
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Prof. & Head,
Dept. of Surgery,
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The student may submit the four copies of thesis, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

29. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
30. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

M.S

in

Surgery

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

January, 2018

DR. SAHIL GARG

DEPARTMENT OF SURGERY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	LAPAROSCOPIC INGUINAL HERNIA REPAIR-TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH
For the degree of	M.S. in General Surgery
Name of the candidate	Dr. Sahil Garg
Supervisor	Dr. Sanjeev K. Singla, Professor, Department of Surgery, DMC&H, Ludhiana
Co-supervisor	Dr. Jaspal Singh, Professor & Head, Department of Surgery, DMCH, Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Inguinal hernia is a common surgical problem in general population, that results due to an abnormal protrusion of an organ or tissue through a defect in the surrounding wall. Laparoscopic Surgery for inguinal hernia is one of the standard approaches for hernia repair. There are two standardized techniques of laparoscopic inguinal hernia repair, Transabdominal preperitoneal repair (TAPP) and Totally Extraperitoneal repair (TEP). Each have merits and risks as compared to the other and the question remains about the best approach of laparoscopic inguinal hernia repair.

Aim of Study: To compare the outcomes of the two standardized techniques of laparoscopic inguinal hernia repair, Transabdominal preperitoneal repair (TAPP) and Totally Extraperitoneal repair (TEP) for inguinal hernia

Materials & Methods: The prospective study will be conducted in the department of General Surgery, Dayanand Medical college and Hospital, Ludhiana from January, 2018 to June, 2019. Patients with unilateral/bilateral inguinal hernia undergoing TEP or TAPP will be compared on Parameters - Intra op complications, including median operative time, intra operative injury, conversion to open repair. Post op data like Seroma formation, post-operative pain, wound infection, hospital stay, re occurrence of hernia

Clinical Significance: Increasing need for excellent results along with Patient satisfaction, have prompted the need to find out the best technique of laparoscopic inguinal hernia repair.

Keywords: Transabdominal Preperitoneal, Totally Extraperitoneal, Inguinal hernia

(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Supervisor	Principal
	DR Jaspal Singh	DR Sanjeev K. Singla	

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH"** exist in the Department of Surgery, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

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Date: 19-1-2018

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Sahil Garg
Department	Surgery
Topic of Thesis	LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH
Likely date of appearing in PG examination	MAY 2020
Date of enrollment	31st May, 2017
Name of Head of Department	Dr. Jaspal Singh
1) Supervisor **2) Co-Supervisor(s)**	Dr. Sanjeev K. Singla Dr. Jaspal Singh
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
1. HOD Pharmacology	1. HOD Physiology
2. HOD Surgery	2. HOD Pathology
3. HOD Pathology	3. HOD Pharmacology
4. HOD Medicine	4. HOD SPM
5. Dean Academics	5. HOD Medicine
6. Vice Principal	6. HOD Surgery
	7. HOD Obst. & Gynae
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	9. Secretary, IEC
	10. Dean Academics
	11. Vice Principal
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Approved: Yes / No

Chairperson
Research Committee

Chairperson
Research Committee

Approved: Yes / No

Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR SAHIL GARG HOUSE NO. 13, STREET NO. 9, JALANDHAR CANTT PUNJAB
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL, LUDHIANA (PUNJAB)
3	COURSE OF STUDY AND SUBJECT	M.S. GENERAL SURGERY
4	DATE OF ADMISSION OF COURSE	31.05.2017
5	TITLE OF THE TOPIC	"LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH"

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Hernia is defined as an abnormal protrusion of an organ or tissue through a defect in surrounding wall. Although a hernia can occur at various sites in the body, these defects most commonly involve the abdominal wall, particularly the inguinal region. About 75% of all hernias occur in the inguinal region.[1]

Inguinal hernia is a common surgical problem in general population. The prevalence of inguinal hernia increases with age. Inguinal hernia can be direct or indirect. The sac of indirect hernia passes through the internal inguinal ring toward the external inguinal ring, into the scrotum. The sac of a direct hernia protrudes outward and forward through the posterior wall of inguinal canal, medial to inferior epigastric vessels.

The surgery for Inguinal hernia has continued to evolve. Various surgical repairs include –

-Tissue repairs like Shouldice, Bassini and Mcvay repairs [1]

- Lichtenstein's tension free mesh repair is the most popular among surgeons due to its short learning curve and low recurrence rates and has firmly established itself as the gold standard for Inguinal hernia.[2]

-With the advent of Minimally invasive procedures in the late 20th century, it has made forays in the Inguinal hernia surgery. The two main techniques of laparoscopic inguinal hernia surgery (LIHS) are the Totally Extraperitoneal repair (TEP) and the Transabdominal Preperitoneal repair (TAPP). They are tension free mesh repairs by a pre-peritoneal approach. The laparoscopic approach provides the advantage of placing a large mesh behind the defect,

covering the myo-pectineal orifice. Today, LIHS is recommended procedure for bilateral/recurrent Inguinal hernia.[3]

The LIHS started in the 1990s and is being rapidly practised worldwide. The advantages of the minimal access surgery include less pain in the early post-operative period, less need for analgesic, better cosmesis, early return to normal activity and decreased wound-related problems.[4]

Increasing need for excellent results along with Patient satisfaction, have prompted the need to find out the best technique of laparoscopic inguinal hernia repair. There are two standardized techniques of laparoscopic inguinal hernia repair, Transabdominal Preperitoneal repair (TAPP), described by Arregui [5] in 1992, and Total Extraperitoneal repair (TEP, described by McKernan and Laws [6] in 1993. The main difference between the two repairs is the sequence of gaining access to the pre-peritoneal space. In the TEP approach, the dissection begins in the preperitoneal space using a balloon dissector. With the TAPP, the preperitoneal space is accessed after initially entering the peritoneal space. Each approach has its merits and demerits.

TAPP is relatively easy to learn but has the disadvantage in that the peritoneal cavity is breached and there is a possibility of bowel adhesions to the mesh.[7,8]

TEP is technically difficult procedure to learn. The working space is more limited and the surgeon needs to be familiar with an unfamiliar anatomy. The advantage is of quicker access of pre-peritoneal space and direct approach to posterior defects and non-violation of peritoneal cavity.[9]

Advantages of using a laparoscopic approach over open repair is the ability to address all defects of the myo-pectineal orifice with the ability to deal with

bilateral hernias through the same incisions, decreased rates of recurrences.[10-12] These outweigh the disadvantages that include increased cost and operative time and the more learning curve.[13,14]

TEP and TAPP are the two standard techniques of inguinal hernia repair. There is a scarcity of data comparing the two techniques, to decide on the best laparoscopic technique of inguinal hernia repair. We hereby design a prospective randomized trial that plan to compare and evaluate TAPP and TEP repair of inguinal hernias in terms of various intra operative and post operative outcomes in the management of unilateral or bilateral uncomplicated inguinal hernia repair.

6.2 REVIEW OF LITERATURE

Repair methods of inguinal hernia have continued to evolve over time. Various techniques have been propagated by the researchers.

Tissue repair [1] procedures like Iliopubic tract repair, Shouldice repair, Bassini repair, McVay repair are done, particularly where mesh prosthesis are contraindicated, as in cases of strangulated hernias where gut resection is required and chances of mesh infection are high. In elective cases, tissue repairs have mostly been abandoned because of high rates of re -occurrence.

Tension free anterior inguinal hernia repair, a concept popularized by Lichenstein became popular [1] Here a piece of non absorbable mesh is fashioned to fit the canal. A slit is cut into the lateral edge of mesh to accommodate the spermatic cord, to add to the strength of the musculature . It became the gold standard and the most widely practiced technique for the inguinal hernia repair.

Laparoscopic repair- laparoscopic hernia repair is a method of tension free mesh repair based on a pre peritoneal approach. The laparoscopic repair gives an advantage of placing a large piece of mesh behind the defect, covering the myopectineal orifice.[1] it has an advantage of use in the bilateral and recurrent inguinal hernias . Other advantages are of providing quicker recovery, less pain, less hospital stay .

Transabdominal Preperitoneal repair (TAPP), described by Arregui [5] in 1992, and Total Extraperitoneal repair (TEP, described by McKernan and Laws [6] in 1993.

Various studies conducted to compare the relative efficiency of the two procedures have been described in the past.

M. Gass et al [15] in 1998 in there population-based analysis comparing outcomes of patients with recurrent inguinal hernia undergoing TEP versus TAPP in a prospective cohort of over 1300 patients found that Intraoperative complications to be significantly higher in patients undergoing TEP. The TEP technique to be associated with longer operating times, but a shorter postoperative length of hospital stay. They concluded, that the absolute outcome differences are small and thus, on a population-based level, both techniques appear to be safe and effective for patients undergoing endoscopic repair for unilateral recurrent inguinal hernia.

Asuri Krishna M. C. Misra et al [16] conducted a prospective randomized study in May 2007 and included 100 patients suffering from uncomplicated primary groin hernia. They concluded that, TEP had a significant advantage over TAPP for significantly reduced postoperative pain up to 3 months, which resulted in a better patient satisfaction score. The other intraoperative complications, postoperative complications, and cost to be similar in both groups. They concluded that In terms of results, both repair techniques seemed equally effective, but TEP had an edge over TAPP.

Sharma D, Yadav K. et al (17) did a Prospective Randomized trial comparing TAPP and TEP approach for bilateral inguinal hernias and found out that The procedures though different in approach were quite similar in outcome. Mean operating time to be increased in the TEP repairs along with immediate post-operative pain scores. The pattern of some complications like subcutaneous

emphysema to be significantly more in the TEP group while minor vascular injury though not significant, different in both groups.

Laparoscopic inguinal hernia repair in the Armed Forces: A 5-year single centre study Brig C.K. Jakhmola a , Wg Cdr Ameet Kumar b [18], concluded that feasibility as well as safety of LIHS to be good as per the short and long term outcomes.

Flore Vărcuæ et al [19] found out that, despite the long learning curve needed; laparoscopic repair is feasible, safe, and provides good satisfaction to the patients. Differences between TEP and TAPP to be related to minor complications, no major difference found

Kockerling et al [20] did a prospective analysis in patients with unilateral inguinal hernia to compare TEP and TAPP and they found out that the intraoperative and general postoperative complication rates as well as the reoperation rate for complications show no significant difference between TEP and TAPP. The higher postoperative complication rate for TAPP, which could be managed conservatively, is partly explained by larger defect sizes, more scrotal hernias and older age.

Wei FX et al [21] did a meta analysis to compare TEP and TAPP and concluded that TEP as a modified and more complex laparoscopic procedure than TAPP, did not lead to a significant difference in aspects of clinical outcomes and complications. Therefore, they firstly recommended TAPP for laparoscopic hernia repair, especially for non expert surgeons. Further choices could be made according to the specific clinical characteristics of patients and surgeons.

Bansal VK et al [22] Did a prospective comparison of long term outcomes following TEP and TAPP surgery and concluded that The TEP and TAPP techniques of laparoscopic repair of inguinal hernia have comparable long-term outcomes in terms of incidence of chronic groin pain, quality of life, and resumption of normal activities. Chronic groin pain had a significant correlation with preoperative pain and early postoperative pain. However, TAPP was associated with significantly higher incidence of early postoperative pain, longer operative time, and cord edema, whereas TEP was associated with a significant higher incidence of seroma formation. The cost was comparable between the two.

6.3 AIMS AND OBJECTIVES OF THE STUDY

To compare the outcomes of the Trans abdominal pre peritoneal repair (TAPP) versus Total Extra peritoneal repair (TEP) for Inguinal hernia.

7. MATERIALS AND METHODS

The study will be conducted in the Department of Surgery, Dayanand Medical College and Hospital, Ludhiana. The study will include patients coming to DMCH having inguinal hernia from 1st January 2018 to 31st March, 2019. A follow up period of 3 months would be kept upto 30th June, 2019.

7.1 Source of Data

Patients with uncomplicated symptomatic unilateral/bilateral inguinal hernia attending the surgical outpatient department of Dayanand Medical College and hospital from Jan 2018 till 31st March, 2019 will be screened for inclusion in the study. The diagnosis of inguinal hernia will be made clinically; patients with obvious clinical evidence of unilateral/bilateral inguinal hernia will be included for the study.

7.2 METHOD OF COLLECTION OF DATA

Laparoscopic TAPP and TEP will be done according to the standard procedural guidelines. Pre operative, Intra operative and Post operative parameters will be recorded on a pre-structured proforma. Relevant demographic parameters, procedure related parameters and post operative parameters will be recorded as described:

INCLUSION CRITERIA

- Primary inguinal hernia
- Recurrent hernia
- Unilateral or Bilateral inguinal hernia
- Age > 18 and < 70 yrs

EXCLUSION CRITERIA-

- Patients unfit for general anaesthesia.
- Obstructed/ Strangulated hernia
- Uncorrected coagulopathy.

Patients would be included in the study only after informed consent.

Patients would be included for TEP (group A) and TAPP (group B) as per the Surgeon's choice of operative technique.

Demographic and clinical data:

Continuous variables: age, weight, height, BMI would be recorded

Categorical variables: sex, presenting complaints, hernia type, any factor contributing to hernia formation like chronic cough , any co-morbid condition like DM, HTN, Occupation , H/O any lower urinary tract symptoms would be recorded.

Procedure related data:

Continuous variables: Operative time (recorded as time from the time of incision for first port entry till closure of last port skin wound)

Categorical variables: Contents of hernial sac, intra-operative complications, like injury to cord structures, injury to vessel.

Conversion to open or to other laparoscopic approach.

Postoperative Recovery:

Continuous Data: Pain scores (recorded on a visual analog scale (VAS) where 0 indicated no pain and 10 indicated the worst possible pain), stoppage of injectable analgesics, return bowel movements and hospital stay.

Categorical Data: Subcutaneous emphysema, ecchymosis

Postoperative Complications: Seroma, wound infection, recurrence at 3 months will be recorded

Morbidity if any

Procedure and Patient preparation-

Relevant history will be recorded along with physical examination findings. Findings of general physical examination and specific systemic examination will be recorded in detail along with the following Investigations-:

1. Haemogram
2. Renal function test
3. Liver function tests
4. Random blood sugar
5. Coagulation profile
   - Prothrombin time/ INR
6. Chest X-ray
7. Ultrasound abdomen (Prostate size)
8. ECG
9. Prostate specific antigen

PRE- ANAESTHETIC CHECKUP: A written informed consent will be taken from all the patients. A thorough pre anesthetic checkup will be conducted preoperatively, one day prior to the surgery. It comprises of detail history, general physical examination and relevant systemic examination of all the patients. Routine investigations like haemogram, renal function test, liver function test, serum electrolytes, random blood sugar and electrocardiogram, chest xray, coagulation profile, urine routine will be undertaken prior to surgery.

PRE MEDICATION

All the patients will be kept fasting for at least 6 hours pre-operatively. On the night before the surgery. Following premedication will be given to all patients: 1. Tab. Alprazolam 0.25 mg HS at night before surgery and 0.25mg at 6.00 am on morning of operation day, orally with a sip of water. 2. Tab. Ranitidine 150 mg HS at night before surgery and 150 mg at 6.00 am on morning of operation day, orally, with sip of water.

OPERATIVE TECHNIQUE

Technique of TAPP repair – After induction of GA, parts cleaned and draped. Pneumoperitoneum of 12-14 mmHg is created with CO2 using a Veress needle at the umbilicus. A standard 10 mm trocar placed 1 cm below the umbilicus for insertion of the laparoscope into the peritoneal cavity . Two additional 5-mm trocars are placed approximately 5–6 cm on either side of the umbilicus at the lateral border of the rectus abdominis muscle at the level of the umblicus. The contents of the inguinal hernia (if any) reduced into the abdomen. The peritoneum is incised lateral to the inferior epigastric vessels 2 cm above the deep ring, extending transversely medially until the medial umbilical ligament, to enable the formation of a peritoneal flap. The dissection carried on to identify Cooper's ligament and the space of Retzius and the lateral wall of the urinary bladder. The lateral limit of dissection corresponds to the anterior superior iliac spine. Inferiorly, the peritoneal flap is raised to identify the cord structures, triangle of doom, psoas major muscle, femoral branch of genitofemoral nerve, and lateral cutaneous nerves. Adequate space is created to accommodate 15 x 10-cm polypropylene mesh. After the dissection, the mesh is rolled and introduced via the 10–12-mm umbilical port

into the space created. The mesh is then unrolled to cover the entire myopectineal orifice on the affected side (covering the femoral, direct, and indirect sites of the hernia). Peritoneum is closed with vicryl 3.0 sutures. Port site is closed with vicryl 2.0 suture for subcutaneous tissue and ethilon 2.0 for skin.

TEP technique- After the induction of anaesthesia , parts cleaned and draped. Here All three ports are made in the midline. A 10 mm port just below the umbilicus is made for the 10-mm 30 telescope. The rectus muscle is retracted laterally after incising the anterior rectus sheath and a blunt dissection is done for the 10-mm 30 telescope to create preperitoneal space. A dissecting balloon is inserted deep to the posterior rectus sheath and advanced to the pubic symphysis. Balloon is inflated under direct laparoscopic guidance. The space is insufflated and additional two 5-mm ports are inserted, one just above the pubic symphysis and the other in the midline between umbilical port and pubic symphysis. The pubic symphysis is the first anatomical landmark recognized. The dissection proceeded laterally, identifying the inferior epigastric vessels and further laterally to correspond to the anterior superior iliac spine. The peritoneal flap is then raised inferiorly exposing the deep ring, triangle of doom, psoas major muscle, and the nerves. The peritoneum is teased down as low as possible. The femoral/direct hernia are easily reduced before identifying the inferior epigastric vessels. The indirect hernia sac is reduced completely if the sac is incomplete; the hernia sac is divided after ligation if it is a complete hernia. The mesh is introduced via the umbilical port (as described in TAPP). The mesh is unrolled and left in

the preperitoneal space, adequately covering the deep inguinal ring, Hasselbach's triangle, and femoral hernia sites.

POST OPERATIVE MANAGEMENT –

Injection of Diclofenac 75 mg I/V will be given for postoperative pain relief and where there is a contraindications, injection Tramadol will be given. Oral fluids to be allowed 6 h postoperative and progressed to normal diet the next day.

The post operative hospital stay, is considered from date of surgery to date of discharge.

OUTCOME

Primary outcome measures

• To compare Intra operative complications (intra operative injury) between TAPP repair and TEP repair of inguinal hernia.

• To compare Post operative complications (wound infection, seroma , re occurrence) between TAPP repair and TEP inguinal hernia.

Secondary outcome data

• Post-operative recovery data (like pain, bowel function, hospital stay) between TAPP repair and TEP repair of inguinal hernia.

Intra operative time measurement between TAPP and TEP repairs .

STATISTICAL ANALYSIS

Data collected of TAPP and TEP will be compared using 't' test and chi square test.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Yes, routine blood investigations and other tests like fasting glucose will be as required prior to laparoscopic inguinal hernia repair.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached herewith

LIST OF REFERENCES

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PROFORMA

Date: S.No:

Name: OPD/WARD:

Age: Sex :

MRD No.: DOA: DOD:

Address:

Time of Hospitalization

BMI-

Chief Complaints

History of present illness:

Any H/O Prolonged cough /Constipation /Urinary symptoms

Duration of swelling-

Progression

Reducibility-

Any complication-

Signature of candidate **Signature of Supervisor**

PAST HISTORY

MALIGNANCY:	
CHRONIC STEROID USE:	
DIABETES:	
HYPERTENSION:	
COPD:	
CARDIOVASCULAR:	
OTHERS:	

PERSONAL HISTORY

SMOKING:

ALCOHOL ABUSE:

NICOTINE/OPOID ABUSE:

VITALS (ON ADMISSION)

HR	**BP**	**RR**	**TEMP**
Pallor	**Edema**	**Icterus**	**Cyanosis**
Lymphadenopathy	**JVP**		

SYSTEMIC EXAMINATION

RESPIRATORY

CVS

CNS

CLINICAL DIAGNOSIS

Signature of candidate **Signature of Supervisor**

INVESTIGATIONS

Date					
Hb/PCV					
TLC					
Platelet count					
Na /K/Cl					
Urea/ Creat					
RBS					
PTI-INR					

Chest X Ray

USG Abdomen/ CECT Abdomen

Surgery performed-

TABLE I - OPERATIVE DATA

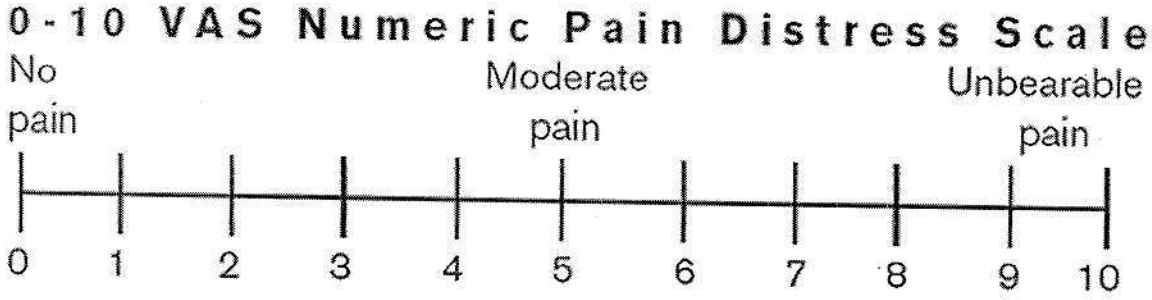
Parameter	Subcategory	TAPP	TEP
Type of hernia	Direct Indirect		
Content of hernia sac			
Operative time (mins)			
Intra operative injury (Cord structure, Viscera, Blood Vessel, Nerve)	Present Absent		
Conversion to Open/ Other laparoscopic repair			

Signature of candidate **Signature of Supervisor**

Table II :Post op data

Parameter	Subcategory	TAPP	TEP
VAS Score	8 hrs 16 hrs 24 hrs 32 hrs 40 hrs 48 hrs		
Injectable analgesic requirement stopped at	16-24 hrs 24- 32 hrs 32- 40 hrs 40- 48 hrs		
Subcutaneous Emphysema	Present Absent		
Return of bowel function (tolerating oral feed , passing flatus) in hours			
Seroma	Present Absent		
Wound infection	At 48 hrs At 7 days		
Hospital stay (In hours)			
Reoccurence	At 7 days At 1 month At 3 months		
OTHERS			

Signature of candidate **Signature of Supervisor**



FOLLOW UP:

Pain

Ultrasound Abdomen

Signature of candidate

Signature of Supervisor

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

.....
Signature of the patient

Name:

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"LAPAROSCOPIC INGUINAL HERNIA REPAIR-TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"LAPAROSCOPIC INGUINAL HERNIA REPAIR- TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS TOTALLY EXTRAPERITONEAL (TEP) APPROACH" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ